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Strait of Georgia Sport Fishery Creel Survey Statistics for Salmon and Groundfish, 1986

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STRAIT OF GEORGIA SPORT FISHERY CREEL SURVEY STATISTICS FOR SALMON AND GROUNDFISH, 1986

by

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TABLE OF CONTENTS

	Page
LIST OF FIGURES	iv
LIST OF TABLES	v
LIST OF APPENDICES	vi
ABSTRACT/RÉSUMÉ	vii
1.0 INTRODUCTION	1
2.0 METHODS	1
2.1 FIELD SURVEYS	2
2.11 Angler Interviews	2
2.12 Aerial Overflights	2
2.2 DATA ANALYSIS	3
3.0 RESULTS	3
3.1 DISTRIBUTION OF SAMPLING EFFORT	3
3.2 SPORT FISHING EFFORT AND CATCH	3
3.21 Salmon	4
3.22 Groundfish	5
3.3 BIOLOGICAL DATA	6
3.31 Proportion and Catch of Marked Chinook and Coho	6
3.32 Catch-At-Age for Chinook	7
3.33 Mean Length-At-Age for Chinook	7
4.0 SUMMARY	8
5.0 ACKNOWLEDGEMENTS	9
6.0 LITERATURE CITED	9
FIGURES	10
TABLES	22
APPENDICES	37

LIST OF FIGURES

Figure		Page
1.	Tidal effort statistics and sport catches of coho and chinook salmon for the Strait of Georgia, 1960-1986	11
2.	Interview site locations, and summer and winter overflight routes, Strait of Georgia, 1986	12
3.	Sample of 1986 interview form	13
4.	Comparison of monthly total fishing effort and monthly total interviews, Strait of Georgia, 1986	14
5.	Monthly fishing effort estimates for the Strait of Georgia sport fishery, 1983 - 1986	15
6.	Monthly chinook catch for the Strait of Georgia sport fishery, 1983 - 1986	16
7.	Monthly chinook catch per boat trip for the Strait of Georgia sport fishery; 1983 -1986	16
8.	Annual sport catches of chinook and coho salmon by Statistical Area in the Strait of Georgia, 1983 - 1986	17
9.	Monthly coho catch for the Strait of Georgia sport fishery, 1983 - 1986	18
10.	Monthly coho catch per boat trip for the Strait of Georgia sport fishery, 1983 - 1986	18
11.	Total salmon landed and total fishing effort expended by Statistical Area in the Strait of Georgia sport fishery, 1983 - 1986	19
12.	Monthly percent age composition of chinook salmon sampled in the Strait of Georgia Creel Survey, 1986	20
13.	Length frequency distribution of chinook salmon sampled in the Strait of Georgia Creel Survey, 1986	21

LIST OF TABLES

Table		Page
1.	Tidal effort statistics and sport catches of coho and chinook salmon for the Strait of Georgia, 1960 - 1986	23
2.	Number of fishing interviews by month and Statistical Area, Strait of Georgia, 1986	24
3.	Fishing effort and catch by species and month, Strait of Georgia, 1986	25
4.	Fishing effort and catch by species and Statistical Area, Strait of Georgia, 1986	26
5.	Monthly catch success by species, Strait of Georgia, 1986	27
6.	Identification of rockfish by species in each Statistical Area, Strait of Georgia, 1986	28
7.	Estimated catch of rockfish by species and Statistical Area, Strait of Georgia, 1986	29
8.	Monthly number of marked chinook observed by region, Strait of Georgia, 1986	30
9.	Monthly number of marked coho observed by region, Strait of Georgia, 1986	31
10.	Monthly estimated catch of marked chinook by region, Strait of Georgia, 1986	32
11.	Monthly estimated catch of marked coho by region, Strait of Georgia, 1986	33
12.	Monthly number and percent age composition of chinook sampled for age in the Strait of Georgia Creel Survey, 1986	34
13.	Monthly estimated catch at age of chinook in the Strait of Georgia, 1986	35
14.	Monthly mean nose-fork length at age of chinook sampled in the Strait of Georgia Creel Survey, 1986	36

LIST OF APPENDICES

Appendix — Page

A. Methods and equations used in analysis of catch and effort statistics for the Strait of Georgia sport fishery creel surveys, 1983-1986 38

B. Catch and effort statistics by month and Statistical Area for Strait of Georgia, 1986 47

B-1. Fishing effort 48

B-2. Coho catch summary 49

B-3. Chinook catch summary 50

B-4. Pink catch summary 51

B-5. Sockeye catch summary 52

B-6. Chum catch summary 53

B-7. Catch summary for total salmonids 54

B-8. Catch summary for released salmon 55

B-9. Rockfish catch summary 56

B-10. Lingcod catch summary 57

B-11. Dogfish catch summary 58

B-12. Catch summary for other finfish 59

C. Strait of Georgia Creel Survey study area 60

D. Species commonly included with other finfish 61

ABSTRACT

Shardlow, T. F. and L. D. Collicutt. 1989. Strait of Georgia sport fishery creel survey statistics for salmon and groundfish, 1986. Can. MS Rep. Fish. Aquat. Sci. 2034 : 61p.

Catch and effort statistics for the Strait of Georgia tidal sport fishery are presented for each month in 1986. The statistics were derived by combining the data from over 35,000 interviews and 69 aerial surveys. Estimates were provided for the number of sport fishing boat trips and the catches of chinook, coho, pink, sockeye and chum salmon along with rockfish, lingcod, dogfish and other finfish. Also given are numbers of marked (adipose fin-clipped) and unmarked chinook and coho examined during the creel survey, and the age composition and length distribution of chinook catches. The appendix includes all catch and effort statistics for each combination of month and Statistical Area.

Keywords: salmon, groundfish, creel survey, sport fishing, catch, effort, age composition, length distribution.

RÉSUMÉ

Shardlow, T. F. and L. D. Collicutt. 1989. Strait of Georgia sport fishery creel survey statistics for salmon and groundfish, 1986. Can. MS Rep. Fish. Aquat. Sci. 2034 : 61p.

Les statistiques relatives aux prises et a l'effort de pêche de la pêche sportive de la zone tidale du détroit de Géorgie sont présentées pour chaque mois de 1986. Ces valeurs ont été obtenues en réunissant les données de plus de 35,000 entrevues et 69 relevés aériens. On y trouve les estimations du nombre de sorties des bateaux de pêche sportive et des prises de saumons quinnat, coho, rose, rouge et kéta en plus de celles de scorpènes, d'ophiodon, d'aiguillat et d'autres poissons. Le nombre de saumons quinnat et coho marqués (coupe de la nageoire adipeuse) et non marqués examinés au cours des relevés des prises et la composition par âges et la distribution par longueur des prises de saumon quinnat sont aussi présentés. On trouve aussi en appendice toutes les statistiques relatives aux prises et à l'effort de pêche pour chaque mois et combination de zones statistiques.

Mots clés: saumon, poisson de fond, releve des prises, pêche sportive, prises, effort de pêche, composition par âges, distribution par longueur.

1.0 INTRODUCTION

This report documents the 1986 catch and effort statistics for the Strait of Georgia sport fishery and discusses methodology for collecting these data. During the 1970s, the sport fishery grew to be the largest harvester of chinook and coho salmon in the Strait of Georgia. Figure 1 and Table 1 show historical catch statistics for the Strait of Georgia sport fishery for the period 1960-1986. Prior to 1980, fisheries managers recognized the need for accurate catch statistics. In 1980, the Strait of Georgia Creel Survey Program was initiated to meet the need for accurate and timely sport catch statistics primarily for chinook and coho. Since then, the objectives of the Creel Survey Program have been expanded to provide accurate estimates of all major sport-caught finfish, and age and length composition of chinook catches. This report is one of a series of Strait of Georgia Creel Survey Reports which document annual creel survey activities and estimation procedures, and provide official published Strait of Georgia tidal sport fishery catch statistics.

In 1986 the creel survey gathered a comprehensive set of annual sport fishing data for Strait of Georgia. There were no project interruptions, and interview and overflight data were collected on a continuous basis throughout the year.

In this report, all figures, tables and appendices are located at the end of text.

2.0 METHODS

The Strait of Georgia Creel Survey is comprised of two independent surveys: angler interviews and aerial overflights. Angler interviews provide data on sport fishing catch per unit effort (CPE) and daily activity patterns. Aerial overflights provide estimates of the total sport fishing effort in the study area at the time of the aerial survey. These data are combined to provide monthly estimates of total sport fishing effort and total catch of salmon and groundfish in the sport fishery. In its simplest form, the estimated total catch is calculated by multiplying estimated total effort by catch per unit effort.

The design of the Strait of Georgia Creel Survey conducted in 1986 was similar to that used in past years. Sampling was conducted during each month of the year and estimates were produced for 10 time periods. January and February data were grouped together, as were November and December data because of reduced fishing activity and sampling in these winter months. Mid-week days and weekend days were considered independently because sport fishing activity is known to be quite different between the two types of days. The Strait of Georgia study area was also stratified by geographic region. Catch and effort statistics were produced for each of the 10

Statistical Areas within the Strait of Georgia (Areas 13 - 19A, 19 B+, 28 and 29, Fig. 2); Statistical Area 19 B+ includes the portion of Area 20 east of Sheringham Point (see Appendix C for a complete description of the study area). Data collection, entry and preliminary processing were conducted for most of the year by LGL Ltd. Environmental Research Associates. However, DPA Consulting Ltd. provided this service during the January to April period. Estimation of catch and effort statistics was conducted by the Department of Fisheries and Oceans.

2.1 FIELD SURVEYS

2.11 Angler Interviews

Sport fishermen were interviewed at the end of their fishing trip to determine time spent fishing, locations fished and catch of each species on the trip. Demographic information was also collected during each interview. Figure 3 shows the interview form used in 1986.

Interviewers trained in fish identification inspected each boating party's catch. Unlike other methods of collecting sport fishery information, such as mail-in or telephone surveys, there was little memory-related recall bias, non-response bias, and fish identification concern with this approach to determining sport fishery catch. Landed chinook and coho were checked for a missing adipose fin which indicates the presence of a coded wire tag embedded in the fish nose cartilage. In addition, scale samples for age determination and measurements for nose-fork length were taken during every sampling shift in the winter and every other shift in the summer. Five scales were removed from the INPFC (International North Pacific Fisheries Commission) preferred area of each biosampled chinook (Mosher 1968).

The interviews were conducted at 31 landing sites (boat ramps, marinas, or resorts, Fig. 2) representative of sport fishing activity in each Statistical Area. The number of sites selected in each area was dictated by targets of desired precision and number of surveyors available. For each area - day type - work block stratum, sampling shifts at a site were chosen on a near random basis from the total number of shifts available. For definition of the above terms (day type, work block, shift) see Appendix A.

2.12 Aerial Overflights

Aerial surveys, conducted from float planes travelling along pre-defined routes, allowed observers to count vessels actively sport fishing throughout the Strait of Georgia. Planes flew at an altitude of 500-700 feet to facilitate a broad range of vision and still allow easy identification of vessel characteristics. Each plane carried three observers, two on the right side and one on the left, and each observer counted sport fishing boats to his/her side of the flight path. Figure 2 shows the flight paths used in 1986. The winter (October - April) flight path was slightly reduced to correspond with lower winter effort.

The flight path and time of departure were designed to cover major concentrations of sport fishing activity at peak periods. Whenever possible, the route was flown to keep most of the sport fishing boats to the right side to allow averaging of the two right side counts. To maximize precision, flying times during which fishing effort was rapidly changing were avoided. The number of overflights each month was governed by targets of desired precision and the expected number of interviews from the given number of sampling shifts (English et al. 1986). The days for overflights during a month were randomly selected for each day type.

2.2 DATA ANALYSIS

Data analysis included calculation of catch and effort statistics, calculation of variance of total fishing effort and total catch, estimation of marked chinook and coho salmon, and estimation of age composition of chinook catch. Appendix A details the methods and equations used in the above data analysis.

3.0 RESULTS

3.1 DISTRIBUTION OF SAMPLING EFFORT

Table 2 shows the number of creel survey interviews conducted by month and Statistical Area in 1986, and the number of monthly overflights. A total of 35,663 interviews (29,044 fishing interviews) and 69 overflights were conducted in 1986. The monthly distribution of interviews reflected the monthly distribution of fishing effort (number of boat trips, Table 3) (Fig. 4). Interview effort was reduced during winter months, especially for Statistical Areas 13, 14 and 15 in the northern portion of Strait of Georgia (Table 2). The total fishing interviews represented 5.0% of the estimated total fishing effort for the entire study area (582,946 boat trips, Table 3) and ranged in each Statistical Area from a low of 1.4% of the estimated fishing effort in Area 18 to a high of 9.2% in Area 28 (Tables 2 and 4).

3.2 SPORT FISHING EFFORT AND CATCH

The 1986 Strait of Georgia sport fishing effort and catch statistics are summarized for each species by month in Table 3 and and by Statistical Area in Table 4. Appendix B shows the fishing effort and catch statistics for each combination of month and Statistical Area.

Sport fishermen made 582,946 boat trips during 1986, which represents a modest decrease over the effort recorded in 1984 and 1985 (Table 1). The fishing effort followed the same general seasonal pattern as seen in previous years (Fig. 5). Effort levels climbed steadily from April, peaked in August, and declined rapidly in September and October. However, compared to previous years, the distribution of fishing effort in 1986 was shifted slightly toward the later months (Fig. 5).

The total finfish sport catch in the Strait of Georgia in 1986 was estimated at 1,069,254 pieces (including steelhead and cutthroat trout, Table 3) and consisted of 71% salmon and 29% groundfish. An additional 166,862 salmon of mixed species were released by anglers (Appendix B-8). The two main catch groups are discussed below.

3.21 Salmon

Salmon sport catches in the Strait of Georgia in 1986 totalled 758,858 pieces (Tables 3 and 4) and consisted of 75% coho, 24% chinook, 0.4% pink salmon, 0.1% sockeye and 0.1% chum salmon.

Chinook sport catches showed a decrease in 1986, with anglers taking 181,896 fish (Tables 3 and 4) compared to 234,838 in 1985 and 369,445 in 1984 (Fig. 1, Table 1). The annual distribution of catch in 1986 was similar to that in 1985 (Fig. 6).

Seasonal catch efficiency for chinook showed the same pattern in 1986 as in 1985 (Fig. 7, Table 5). However, catch per boat trip declined more than usual in the late summer. The decline in chinook catch in July 1986 and the reduced catch efficiency seen in the late summer months were probably the result of low abundance of age 2 chinook which usually recruit to the fishery during this time period. Section 3.32 provides details on catch at age which support the suggestion of reduced age 2 abundance.

As in previous years, the highest chinook catches were taken in Area 13 (26% of total), followed by Areas 14 and 19B+, each with 19% of total (Table 4, Fig. 8). In some months, other Statistical Areas dominated the catch (Appendix B-3). During the summer months (May - September) in 1986, 78% of the landed chinook were taken in the northern region of Strait of Georgia - Statistical Areas 13 to 17. The opposite was true in the winter months (January - April, October - December) when 66% of the chinook catch came from the southern region - Statistical Areas 18, 19, 28 and 29. During November and December, many of the chinook came from Victoria/Sooke waters in Statistical Area 19B+.

The 1986 coho catch of 571,980 pieces (Tables 3 and 4) represents a decrease from the 1985 level (Fig. 1, Table 1). Coho catches in 1986 showed an average seasonal timing with the catch peaking in July (Fig. 9). Coho catch success in 1986 reached a high of 1.6 fish per boat trip in May, then declined through August (Fig. 10, Table 5). As in previous years, the highest coho catches were taken in Area 13 (37% of total) and Area 14 (27%) (Table 4, Fig. 8).

In 1986, Strait of Georgia anglers caught approximately 3,000 pink salmon (Table 3). Significant pink catches were not expected in 1986 because pink salmon returns to Strait of Georgia rivers (primarily the Fraser River) are much lower in even numbered compared to odd numbered years. Areas 13 and 14 were responsible for 82% of the pink catch (Table 4).

The landings of other salmon consisted of an estimated 918 sockeye and 919 chum salmon (Table 3). Most of the sockeye (79%) were taken during August and September in Statistical Areas 19B+, 28 and 29 (Appendix B-5), while a large portion of chum salmon (56%) was caught during August to October in Statistical Area 13 (Appendix B-6).

In addition to the above salmon species, an estimated 1,503 steelhead, cutthroat trout and unidentified salmon were caught in the Strait of Georgia in 1986, bringing the total salmonid catch to 760,361 pieces (Appendix B-7).

The average number of total salmon caught during each boat trip in 1986 was 1.3 (Table 5), the same as in 1984. This represents a better catch success for salmon than during the 1981 to 1983 period when between 1.0 and 1.2 salmon per boat trip were reported (Shardlow et al. 1989), but less than the 1.7 fish per boat trip reported in 1985 (Shardlow and Collicutt 1989b).

In 1986, as in previous years, more salmon were landed and more effort was expended in Area 13 than in any other Statistical Area (Table 4, Fig. 11). Boaters fishing in Area 13 had an average catch of 2.0 salmon per trip. Area 14, as in the last several years, recorded the greatest number of salmon hooked and released (50,212), with Area 13 next at 48,906 pieces (Appendix B-8). These two areas have major coho fisheries characterized by the release of many sub-legal coho.

3.22 Groundfish

While salmon accounted for the majority of the total finfish sport catch in the Strait of Georgia in 1986, the groundfish catch of 308,893 pieces made up 29% of the overall catch (Tables 3 and 4). The species composition of the groundfish catch, based on the Table 4 data, was as follows:

Groundfish species	Catch	% Of total groundfish catch	Major catch Area
Rockfish (Sebastes spp.)	167,783	54%	16
Lingcod (Ophiodon elongatus)	70,817	23%	13
Dogfish (Squalus acanthias)	5,212	2%	16
Other finfish (Appendix D)	65,081	21%	18
Total	308,893	100%	

The majority of the groundfish catch was taken in the summer months, reflecting the seasonal change in fishing effort (Table 3, Fig. 4). Catch by Statistical Area for rockfish was highest in Area 16 (29% of total, Table 4). Lingcod as in previous years, were caught in greatest numbers in Area 13 (36% of total), while the largest dogfish catch came from Area 16 (33% of total, Table 4). Area 18 produced the largest catch of other finfish (22% of total).

Rockfish species were identified for the entire survey area for the third consecutive year in 1986 (Table 6). Applying the identification results to the 1986 rockfish catch estimates (Table 7) showed the following species dominance:

Rockfish species	Catch	% Of total rockfish catch	Major catch Area
Quillback	63,845	38%	16
Copper	47,470	28%	16
Yelloweye	9,780	6%	16
Black	4,090	2%	19 B+
Other	42,598	25%	19 B+
Total	167,783	100%	

The above "other" rockfish category consisted of tiger, yellowtail, china, canary and unidentified species.

The catch success (CPE) for rockfish was relatively constant throughout the year and averaged 0.3 fish per boat trip,while the catch success for lingcod was 0.1 fish per boat trip (Table 5). The catch success for all non-salmon species averaged 0.5 fish per boat trip and was also relatively constant throughout the year. Catch success for total finfish during 1986 was 1.8 fish per boat trip (Table 5).

3.3 BIOLOGICAL DATA

3.31 Proportion and Catch of Marked Chinook and Coho

In 1986, 9,664 chinook and 27,647 coho were examined for adipose fin clip marks. Tables 8 and 9 show the observed numbers of marked chinook and coho respectively, by month and region. Data were presented by region since some Statistical Areas had insufficient numbers of fish examined for marks in some months, and those data were included with other Areas. Three regions were defined: the North Gulf represented by Areas 13-16; the South Gulf represented by Areas 17, 18, 28, 29 and the Saanich Inlet portion of Area 19 (Area 19A); and Victoria region represented by the remainder of Area 19 (Area 19B+) (Fig. 2).

Among chinook examined for marks, 3.0% had adipose fin clips. The largest observed proportion of chinook marks was in the North Gulf catch (0.041) and the lowest proportion in the Victoria catch (0.016, Table 8). Among coho examined for marks, 5.5% had adipose fin clips. The largest observed proportion of coho marks was in the South Gulf catch (0.063), and the lowest proportion in the Victoria catch (0.035, Table 9). Monthly catch estimates of marked chinook and coho are shown by region in Tables 10 and 11 respectively. The seasonal recovery pattern of marked chinook and coho salmon was generally similar to that observed in previous years (Shardlow and Collicutt 1989a,b).

3.32 Catch-At-Age for Chinook

During 1986, 1,916 chinook biosamples were collected for age and length analysis. Table 12 shows the monthly number and percent age composition of chinook sampled for age. These data are summarized graphically in Figure 12. The monthly age proportions were applied to the estimated monthly chinook catches to provide breakdown by age group (Table 13). In 1986, the chinook sport catch in the Strait of Georgia was dominated by both age 3 (44.9%) and age 4 (40.4%) fish, followed by age 2 (10.9%) and age 5 or older (3.8%). The catch breakdown by age group is compared below for years 1983 to 1986:

Catch year	% Age composition of chinook 2	3	4	5+	Reference
1983	57.1	25.5	14.2	3.1	Shardlow et al. (1989)
1984	21.6	67.3	9.4	1.7	Shardlow and Collicutt (1989a)
1985	6.6	70.8	20.6	2.0	Shardlow and Collicutt (1989b)
1986	10.9	44.9	40.4	3.8	This report.

The age composition of the chinook sport catch in 1986 was similar to that in 1985 in that the age 2 component was smaller than in previous years. The age 3 catch component in 1986 was smaller than in 1984 or 1985. A low catch of age 3 chinook in 1986 might be expected given the low catch of age 2 fish the previous year (Shardlow and Collicutt 1989b). Low recruitments of age 2 chinook over the past two years combined to produce the lowest chinook catch since 1982 (Table 1).

Figure 12 and Table 12 show a shift in the age composition of sampled chinook and hence of chinook catch, between the first eight months and the remainder of the year. From January to August the catch was dominated by age 3 and 4 fish. In September the age 2 group strengthened, and together the age 2 and 3 classes became the dominant age groups for the remainder of the year. The low catch contribution of age 2 chinook in the summer of 1986 was likely the result of poor age 2 recruitment to the sport fishery. Age 2 chinook generally reach the minimum legal size limit of 45 cm in July (Argue et al. 1983).

3.33 Mean Length-At-Age for Chinook

Table 14 shows the monthly mean nose-fork length at age for the 1,916 chinook for which both length and age data were available. Figure 13 shows the length frequency distribution for all the measured chinook (2,430 aged and unaged fish). The largest portion of measured chinook (1,332 fish or 55% of the total sample) was in the 55-74 cm length category. This is consistent with the large catch proportion of age 3 and 4 fish (Table 13) which were found to have an annual mean length of 62.9 cm and 76.4 cm respectively (Table 14). Of the

total chinook measured in 1986, 2% were sub-legal in size (less than 45 cm) and these were landed mostly in June and July. The largest chinook sampled (110 cm) was landed at Ladysmith in Area 17 on May 24, 1986, and was 5 years old.

4.0 SUMMARY

A sport fishery creel survey was conducted in the Strait of Georgia in 1986 in order to estimate the catches of all the important recreational finfish species and the total sport fishing boat trips. The number of chinook and coho salmon with adipose fin clips were also estimated. These data are presented by month and Statistical Area. Monthly age and length compositions of chinook catch are also shown.

In 1986, a total of 35,663 boating parties were interviewed at 31 landing locations in the Strait of Georgia creel survey area. The 29,044 fishing interviews conducted represents approximately 5% of the total number of boat trips conducted by sport fishermen in the Strait of Georgia in 1986. A total of 69 overflights were also conducted to take "snapshot" counts of fishing effort.

In 1986, sport fishermen made an estimated 582,946 boat trips in the Strait of Georgia and landed an estimated total finfish catch of 1,069,000 pieces of which 71% were salmon and 29% were groundfish. The 759,000 landed salmon consisted of 572,000 coho, 182,000 chinook, 3,000 pink salmon, 900 sockeye and 900 chum salmon. An additional 167,000 salmon of mixed species were released by anglers.

The 309,000 landed groundfish consisted of 168,000 rockfish, 71,000 lingcod, 5,000 dogfish and 65,000 other finfish. Rockfish catches were identified as quillback (38% of rockfish catch), copper (28%), yelloweye (6%), and black (2%); the remaining 25% of the rockfish catch consisted of tiger, yellowtail, china, canary and unidentified species.

Catch success per boat trip averaged 1.3 salmon (all species) and 0.5 groundfish.

Among salmon examined for marks, 3.1% of chinook and 5.5% of coho had adipose fin clips. The majority of chinook sport catch in 1986 consisted of age 3 and 4 fish (85.3%), followed by age 2 (10.9%) and age 5 or older (3.8%). Of the total chinook measured in 1986, 2% were sub-legal in size (less than 45 cm).

5.0 ACKNOWLEDGMENTS

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FIGURES

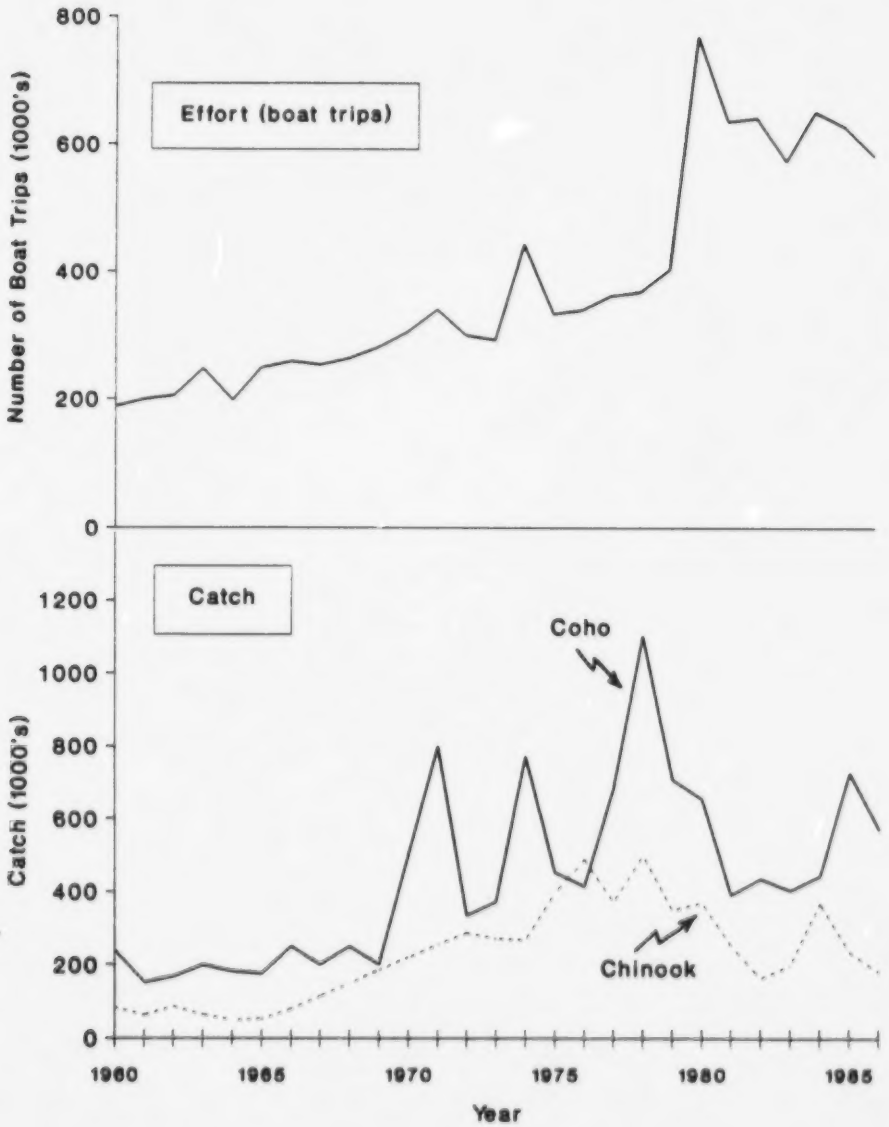

Figure 1. Tidal effort statistics and sport catches of coho and chinook salmon for the Strait of Georgia, 1960 - 1986.

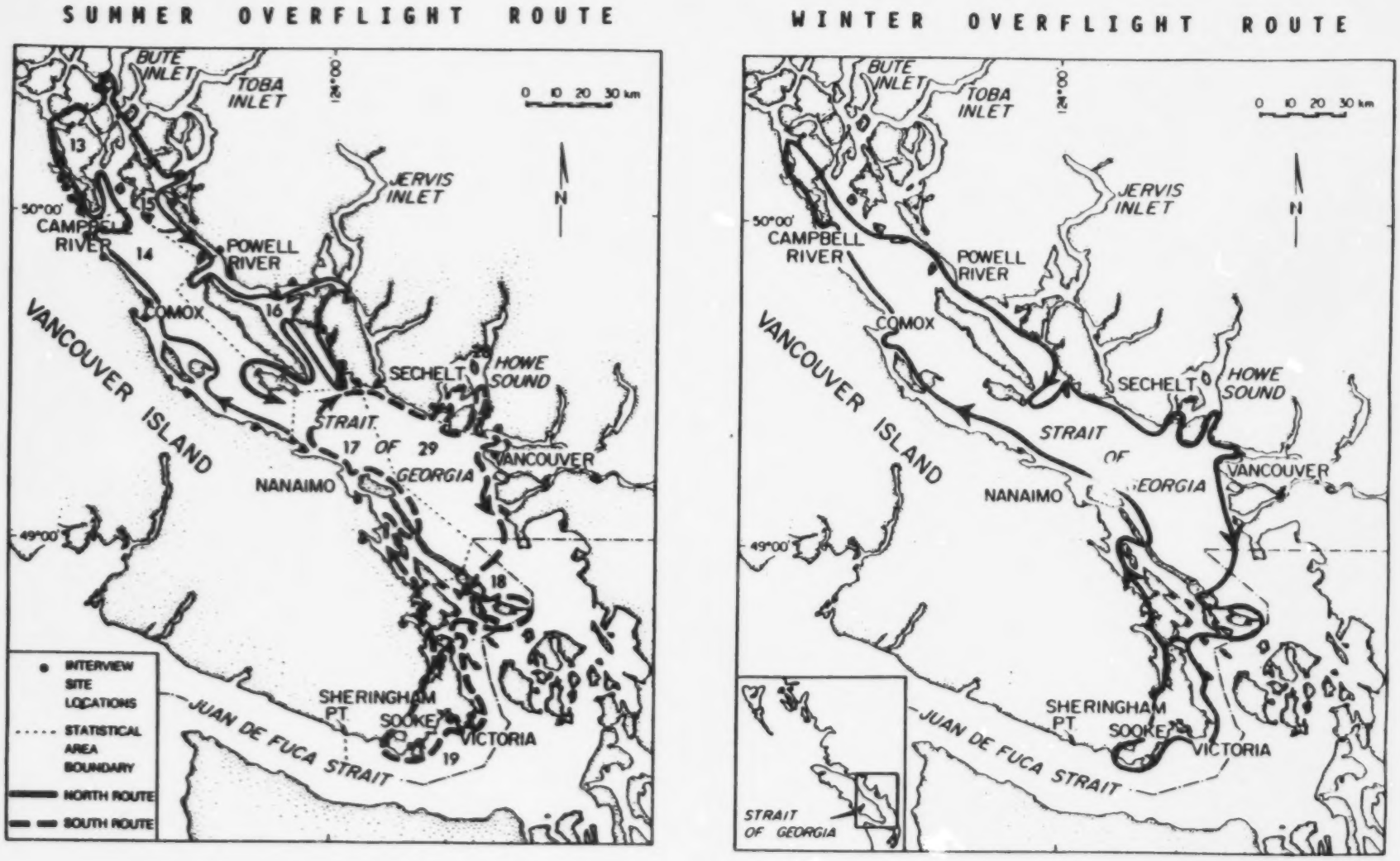

Figure 2. Interview site locations, and summer and winter overflight routes, Strait of Georgia, 1986.

STRAIT OF GEORGIA SPORT FISHING CREEL SURVEY N° 21410

Landing Area: _____/_____ Statistical Area: _____

Interviewer: _____/_____ Date: ___/___/___ (YR / MO / DAY) Time of Interview ____:____ AM PM

PRESENT BOAT TRIP COMPLETED

1. Total number of individuals in party: [ ] # < 16 yrs. [ ]

Assessment Code [ ]
0 = Complete Form
1 = Marks Incomplete
2 = Other Incomplete

2. Time of landing: ____:____ AM PM Time block: [ ]

3. Was your party sport fishing on this trip: YES NO

4. Guided: YES NO

5. Residences of party: B.C. [ ] Rest of Canada [ ] Other [ ]

6. Length of boat trip: [ ] HRS.

7. Times lines were in the water: (EXCLUDE time not fishing)

AM			PM	
☐ (1) before 7:00	☐ (5) 10:00-10:59	☐ (9) 2:00-2:59		☐ (13) 6:00-6:59
☐ (2) 7:00-7:59	☐ (6) 11:00-11:59	☐ (10) 3:00-3:59		☐ (14) 7:00-7:59
☐ (3) 8:00-8:59	☐ (7) 12:00-12:59	☐ (11) 4:00-4:59		☐ 15) 8:00-8:59
☐ (4) 9:00-9:59	☐ (8) 1:00- 1:59	☐ (12) 5:00-5:59		☐ (16) 9:00-plus

8. Average number of lines in the water for TOTAL boat party: [ ]

9. CATCH SUMMARY

Total catch for trip: [ ]

Total time fishing: [ ] HRS.

	1ST SUB AREA	2ND SUB AREA	3RD SUB AREA
GO TO MAP:			
KEPT:			
RELEASED:			
TIME:	HRS.	HRS.	HRS.

MARKS

CHINOOK
ADIPOSE MISSING [ ] UNMAKRED [ ]

COHO
ADIPOSE MISSING [ ] ADIPOSE & L. PELVIC MISSING [ ] ADIPOSE & R. PELVIC MISSING [ ]
UNMARKED [ ] L. PELVIC MISSING ONLY [ ] R. PELVIC MISSING ONLY [ ]

10. How much fishing time was directed at each of the following?

CO [ ] CN [ ] SM [ ] LC [ ] RF [ ]
GF [ ] SF [ ] OTHER [ ]

Number of boats remaining out after 11:00 PM:

Figure 3. Sample of 1986 interview form.

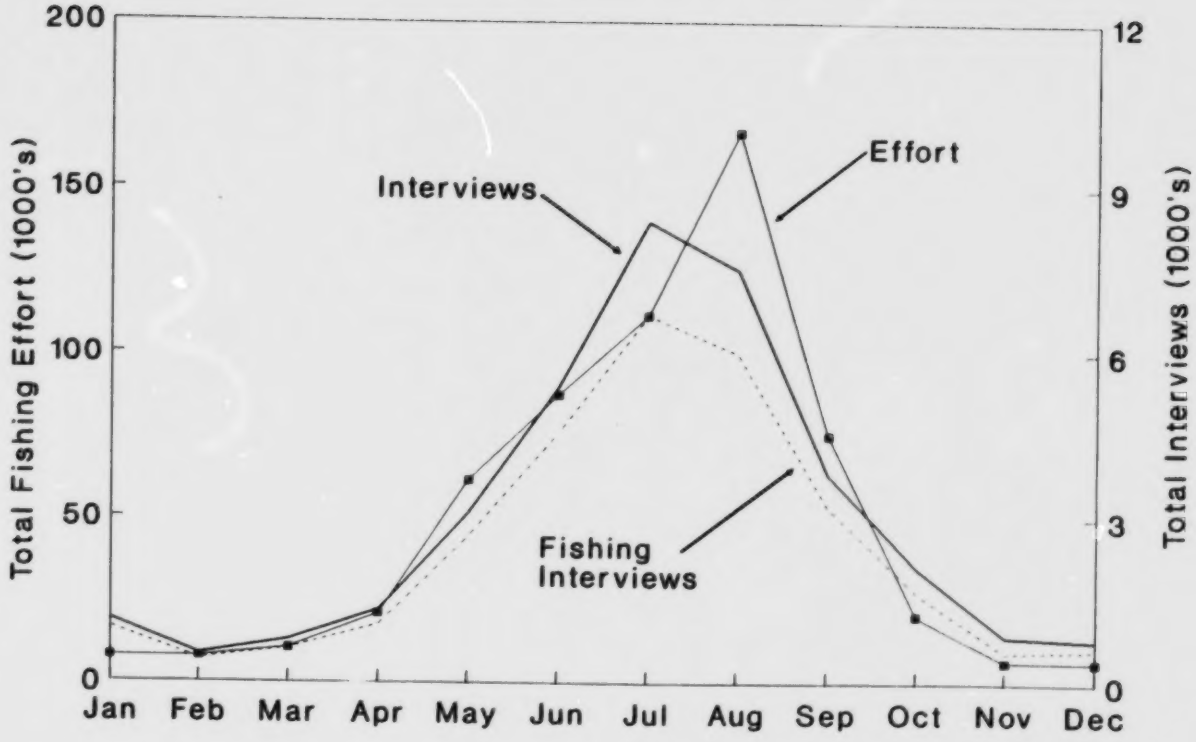

Figure 4. Comparison of monthly total fishing effort, monthly total interviews and monthly total fishing interviews, Strait of Georgia, 1986.

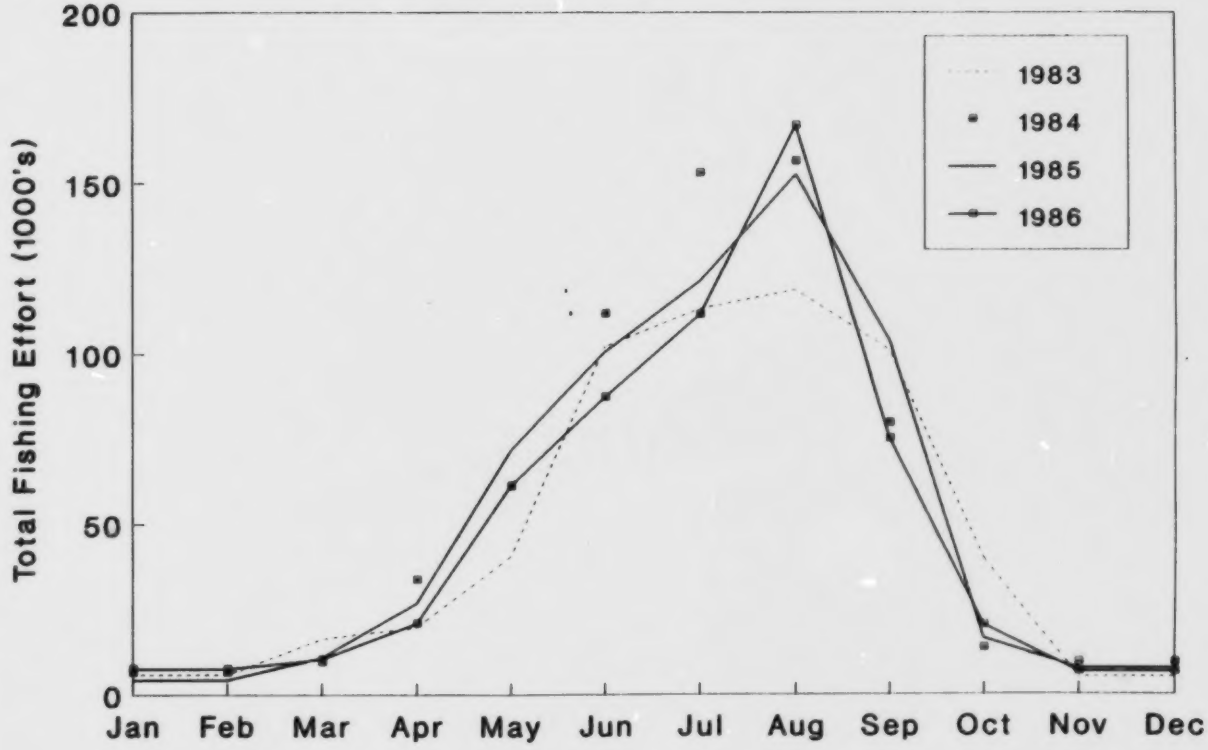

Figure 5. Monthly fishing effort estimates (number of boat trips) for the Strait of Georgia sport fishery, 1983 - 1986.

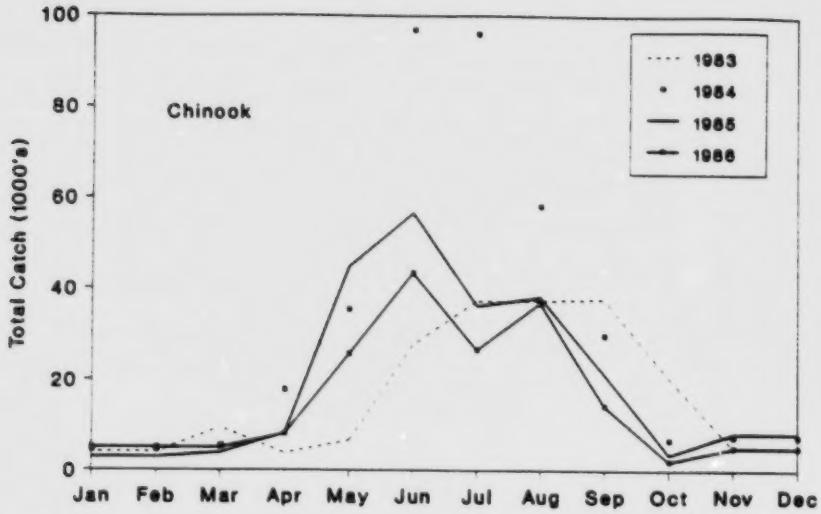

Figure 6. Monthly chinook catch for the Strait of Georgia sport fishery, 1983 - 1986.

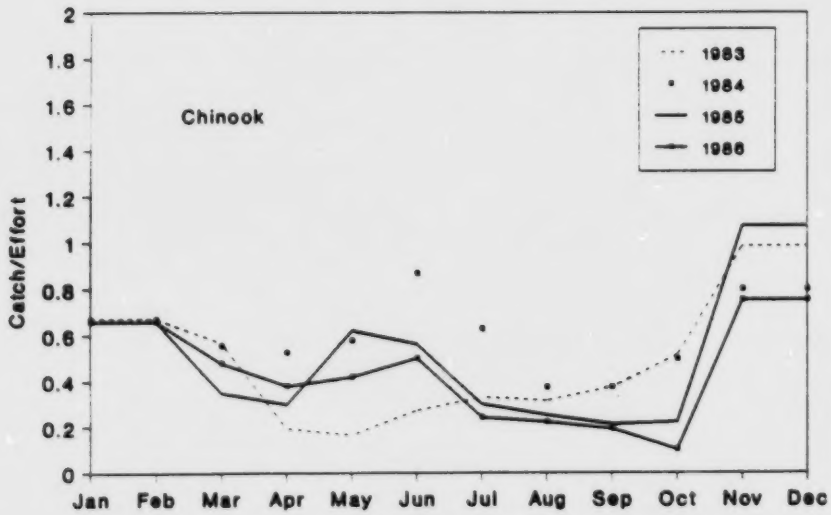

Figure 7. Monthly chinook catch per boat trip for the Strait of Georgia sport fishery, 1983 - 1986.

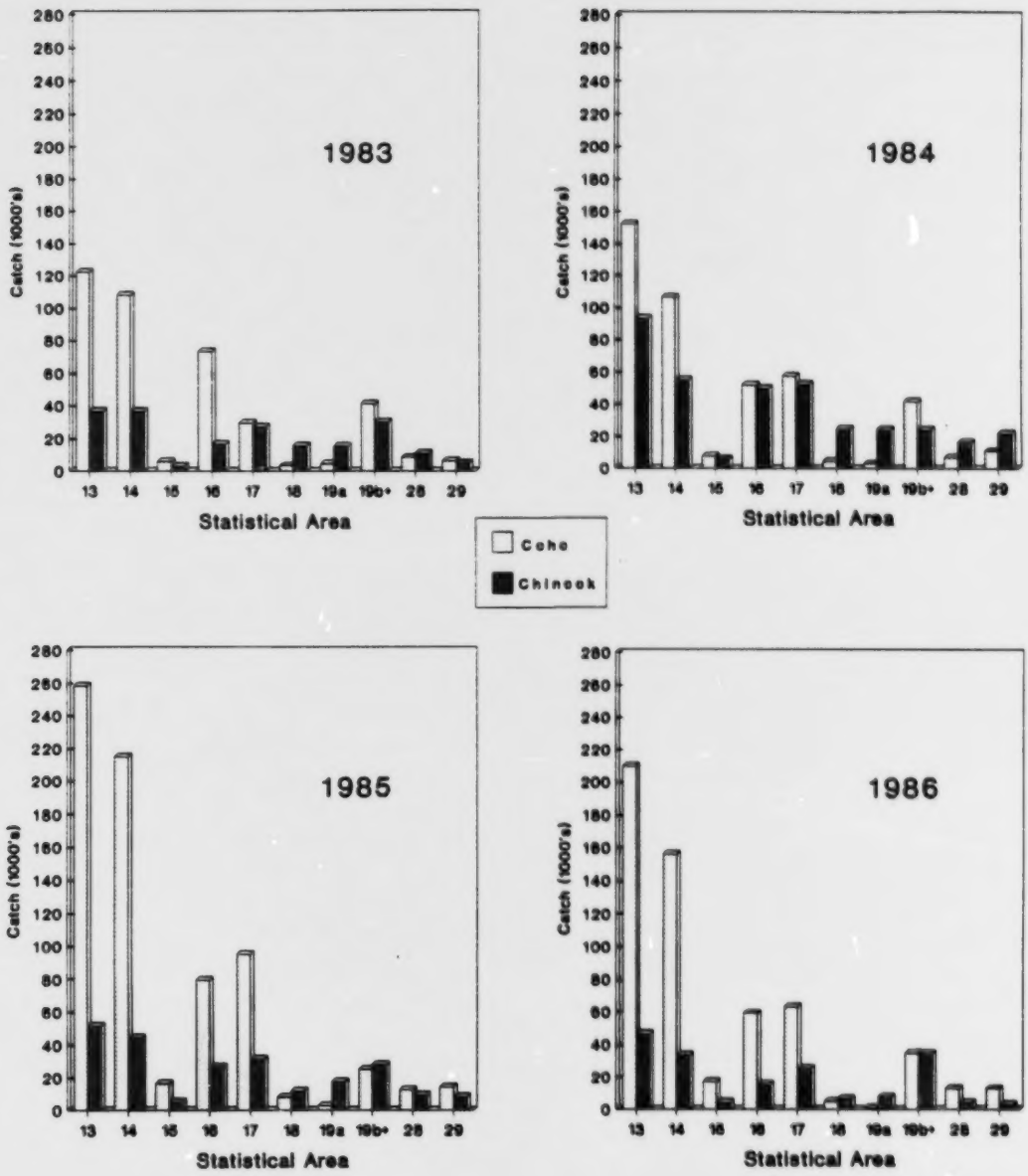

Figure 8. Annual sport catches of chinook and coho salmon by Statistical Area in the Strait of Georgia, 1983 - 1986.

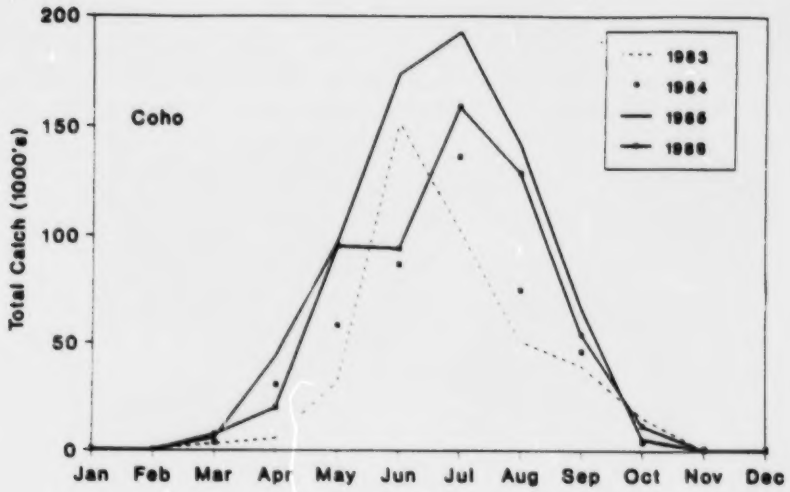

Figure 9. Monthly coho catch for the Strait of Georgia sport fishery, 1983 - 1986.

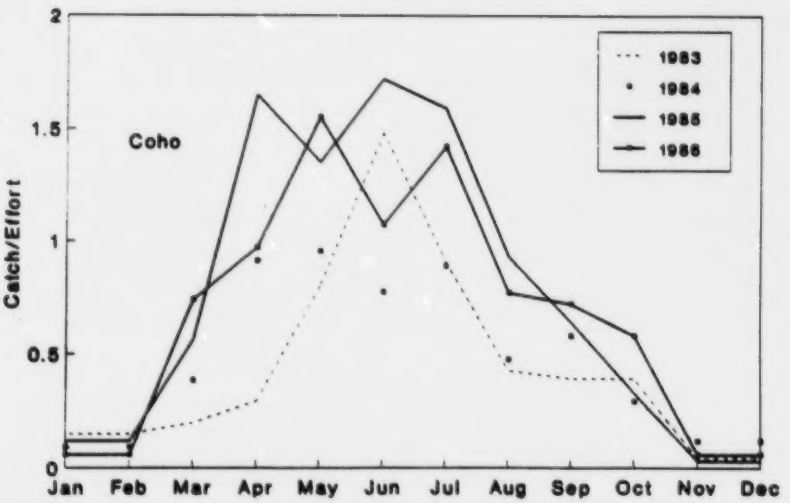

Figure 10. Monthly coho catch per boat trip for the Strait of Georgia sport fishery, 1983 - 1986.

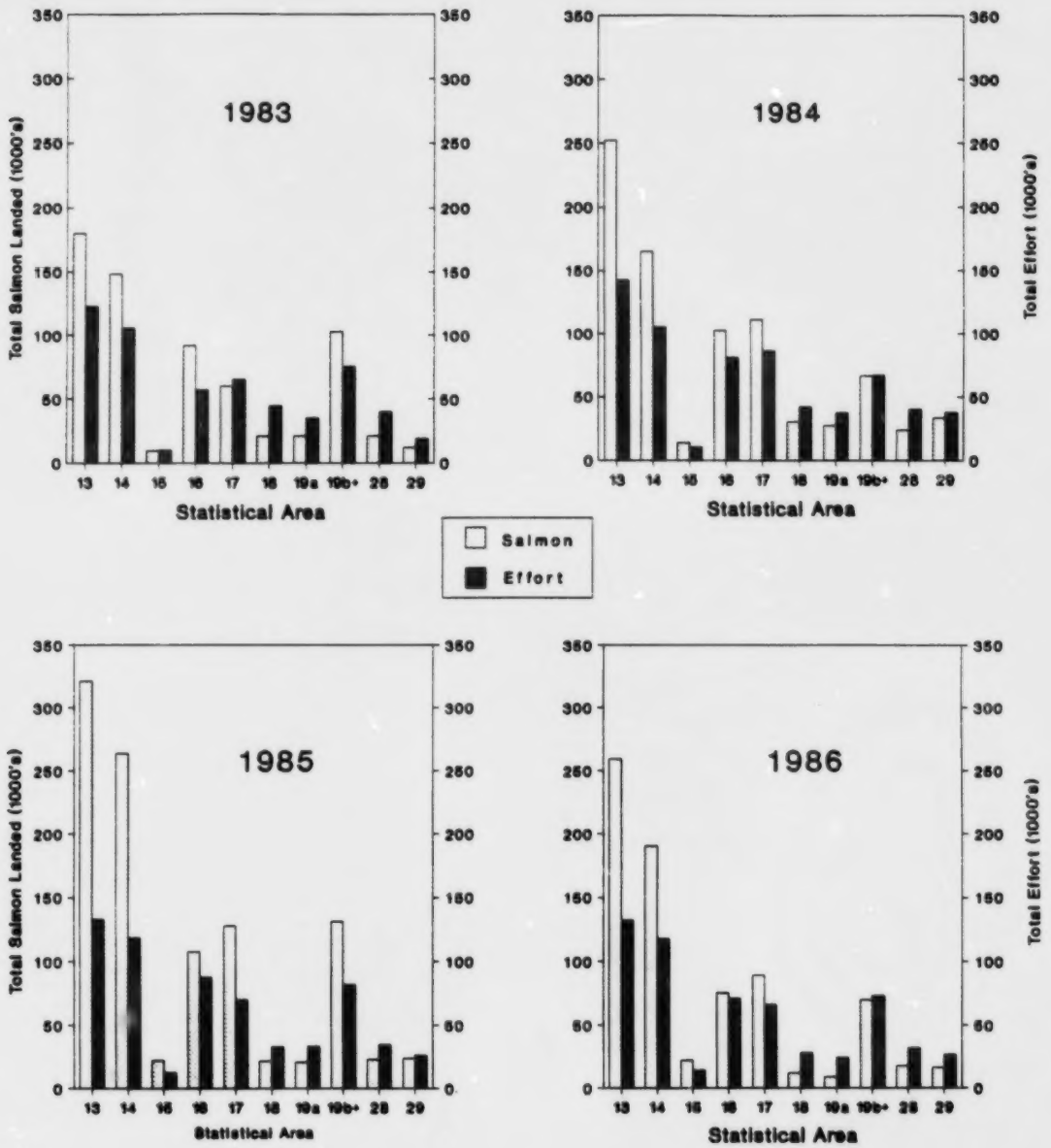

Figure 11. Total salmon landed and total fishing effort expended by Statistical Area in the Strait of Georgia sport fishery, 1983 - 1986.

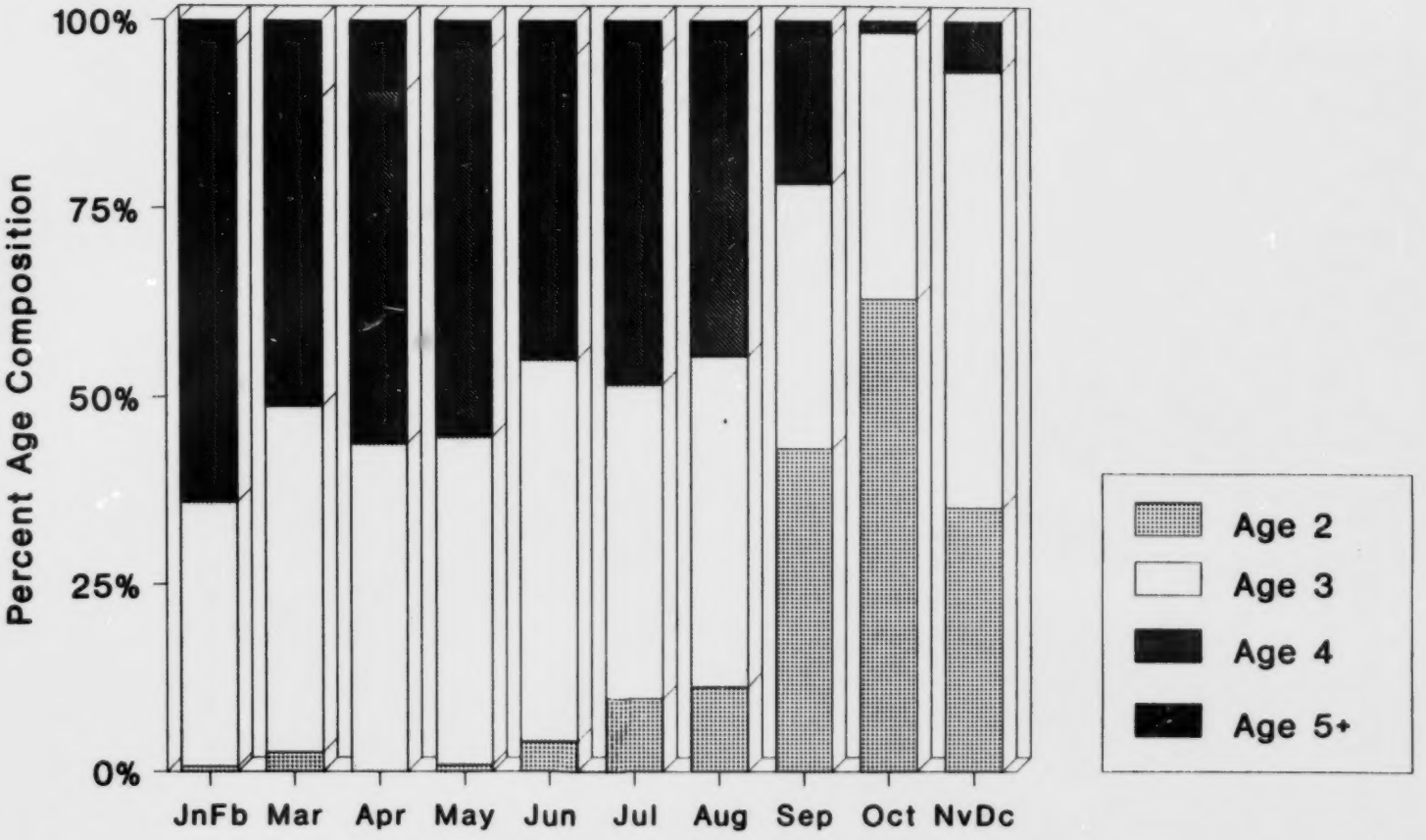

Figure 12. Monthly percent age composition of chinook salmon sampled in the Strait of Georgia Creel Survey, 1986.

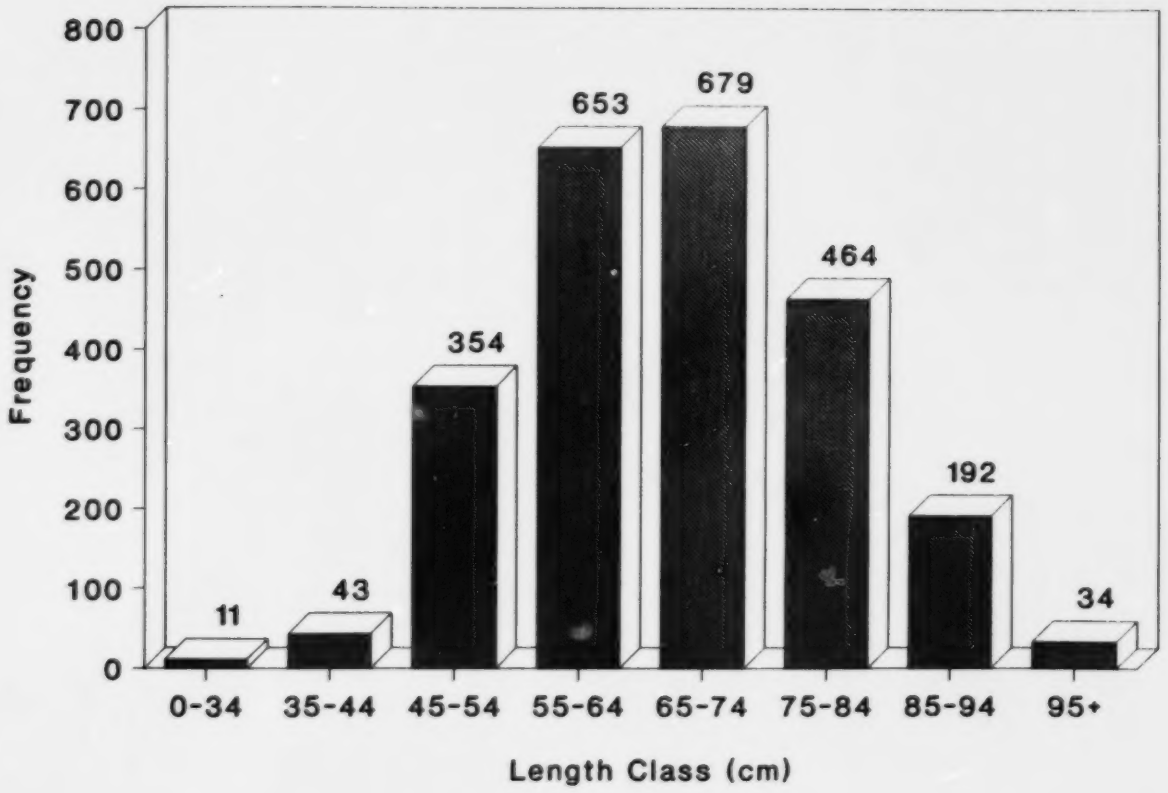

Figure 13. Length frequency distribution of chinook salmon sampled in the Strait of Georgia Creel Survey, 1986.

TABLES

Table 1. Tidal effort statistics and sport catches of coho chinook salmon for the Strait of Georgia, 1960 - 1986.*

Year	Effort (boat trips)	Catch	
		Coho	Chinook
1960	189,150	238,000	83,000
1961	199,935	152,000	63,000
1962	205,547	167,000	86,000
1963	247,590	199,000	65,000
1964	198,120	182,000	51,000
1965	250,020	175,000	53,000
1966	259,100	249,000	80,000
1967	254,500	200,000	115,000
1968	265,030	250,000	150,000
1969	281,475	200,000	185,000
1970	306,255	500,000	220,000
1971	341,123	800,000	255,000
1972	300,349	335,000	287,000
1973	293,141	373,000	272,000
1974	443,441	772,000	269,000
1975	334,490	454,000	398,000
1976	340,729	415,000	490,000
1977	363,350	682,000	372,000
1978	369,035	1,103,000	500,000
1979	404,710	708,735	350,000
1980	769,000	655,000	371,000
1981	637,000	391,200	253,300
1982	642,200	436,090	163,793
1983	574,257	404,031	198,433
1984	651,090	443,590	369,445
1985	628,513	728,197	234,838
1986	582,946	571,980	181,896

* Source: Coho catch statistics: 1960-1978 from Argue et al. (1983), 1979 from R. Kadowaki (pers. comm.), 1980-1982 from Shardlow et al. (MS 1989), 1983 from Shardlow et al. (1989), 1984 and 1985 from Shardlow and Collicutt (1989a and b).
Chinook catch statistics: 1960-1977 from Argue et al. (1983), 1978 and 1979 from B. Riddell (pers. comm.) following the methods of Argue et al. (1983), 1980-1982 from Shardlow et al. (MS 1989), 1983 from Shardlow et al.(1989), 1984 and 1985 from Shardlow and Collicutt (1989a and b).
Effort statistics: 1960-1979 from annual published and unpublished Fisheries Officer statistics, 1980-1982 from Shardlow et al. (MS 1989), 1983 from Shardlow et al. (1989), 1984 and 1985 from Shardlow and Collicutt (1989a and b).

Table 2. Number of fishing interviews by month and Statistical Area, Strait of Georgia, 1986.

Month	Statistical Area										Total	Over-flights
	13	14	15	16	17	18	19A	19B+	28	29		
Jan+Feb	42	29	0	184	65	22	54	844	72	97	1,409	4
Mar	4	49	0	46	166	7	20	277	28	31	628	4
Apr	11	144	0	84	340	12	44	353	38	26	1,052	4
May	193	777	0	424	516	0	181	289	231	41	2,652	7
Jun	771	1,130	69	517	567	0	236	622	503	130	4,545	10
Jul	1,625	1,355	147	708	760	65	242	762	814	213	6,691	12
Aug	1,579	1,126	112	651	460	99	203	740	713	322	6,005	9
Sep	653	515	43	273	371	45	136	503	300	371	3,210	8
Oct	90	169	0	147	126	118	109	698	126	69	1,652	6
Nov+Dec	2	14	1	135	23	32	39	805	76	73	1,200	5
Total	4,970	5,308	372	3,169	3,394	400	1,264	5,893	2,901	1,373	29,044	69

Table 3. Fishing effort and catch by species and month, Strait of Georgia, 1986.

Month		Effort No. Boat Trips	Coho	Chinook	Pink	Sockeye	Chum	Rock-Fish	Lingcod		Dog-Fish	Other Finfish	Total Finfish	
Jan+Feb	Estimate	15,468	901	10,140	0	0	31	3,577	74	*	10	4,524	19,257	
	S.E.	1,750	175	2,197	0	0	24	517	60		7	1,531	2,734	
Mar	Estimate	10,474	7,782	5,022	0	0	0	2,503	74	*	39	2,257	17,677	
	S.E.	734	1,051	458	0	0	0	792	39		24	862	1,639	
Apr	Estimate	20,938	20,381	8,026	0	0	7	5,500	2,055		0	3,025	38,994	
	S.E.	2,685	3,213	1,168	0	0	7	2,133	449		0	1,264	4,247	
May	Estimate	61,359	95,084	25,649	85	0	0	17,490	12,702		75	7,945	159,030	
	S.E.	3,565	10,906	1,667	53	0	0	1,829	1,337		40	1,324	11,341	
Jun	Estimate	87,351	93,858	43,384	405	0	0	21,337	9,074		1,233	4,234	173,525	
	S.E.	3,887	6,750	2,450	83	0	0	1,292	696		240	367	7,343	
Jul	Estimate	111,514	158,869	26,551	675	0	11	30,577	16,481		1,123	8,124	242,411	
	S.E.	3,049	6,006	1,036	97	0	8	1,570	911		187	1,394	6,514	
Aug	Estimate	166,945	128,559	36,961	1,558	344	337	59,127	18,932		1,535	16,504	263,857	
	S.E.	4,499	4,413	1,571	275	85	129	3,006	1,042		314	1,337	5,835	
Sep	Estimate	75,165	53,975	14,236	415	529	258	18,360	7,882		1,142	12,501	109,298	
	S.E.	4,131	4,562	1,242	192	124	70	1,534	881		283	2,736	5,754	
Oct	Estimate	20,393	11,754	1,962	7	39	261	5,701	2,923		9	4,424	27,080	
	S.E.	1,080	1,376	257	6	18	86	651	345		6	1,027	1,888	
Nov+Dec	Estimate	13,339	817	9,965	0	6	14	3,611	620	*	46	1,543	16,622	
	S.E.	1,555	200	1,672	0	8	15	593	254		23	338	1,835	
Total	Estimate	582,946	571,980	181,896	3,145	918	919	167,783	70,817		5,212	65,081	1,067,751	**
	S.E.	9,424	15,946	4,809	363	153	173	5,009	2,314		523	4,354	18,090	

* A total closure for lingcod was in effect from January 1 to April 15, and November 15 to December 31. Reported figures most likely represent illegal catches by anglers.

** In addition, an estimated 1,503 steelhead, cutthroat trout and unidentified salmon were caught by sport fishermen.

Table 4. Fishing effort and catch by species and Statistical Area, Strait of Georgia, 1986.

Statistical Area		Effort No. Boat Trips	Coho	Chinook	Pink	Sockeye	Chum	Rock-Fish	Lingcod	Dog-Fish	Other Finfish	Total Fishfish
13	Estimate	132,177	209,690	46,609	2,136	40	527	21,245	25,788	863	5,266	312,164
	S.E.	4,860	9,069	2,388	324	35	132	1,456	1,585	208	567	9,647
14	Estimate	117,359	156,305	33,682	445	0	3	20,680	9,714	631	9,846	231,306
	S.E.	5,317	11,592	2,001	97	0	3	1,663	919	157	1,548	12,017
15	Estimate	14,123	17,355	4,538	12	0	1	2,702	1,272	6	368	26,254
	S.E.	827	1,279	474	7	0	2	242	138	5	99	1,396
16	Estimate	70,521	59,082	15,592	278	20	2	48,914	9,364	1,696	9,425	144,373
	S.E.	3,041	2,991	1,141	116	18	2	3,459	956	393	774	4,888
17	Estimate	65,609	63,140	25,290	166	2	98	18,449	6,332	185	7,093	120,755
	S.E.	2,940	4,524	1,403	46	4	46	1,344	501	44	1,106	5,072
18	Estimate	28,000	4,821	6,665	7	100	2	12,926	4,250	177	14,314	43,262
	S.E.	1,047	363	544	6	36	2	1,025	389	55	3,527	3,751
19A	Estimate	24,278	1,029	7,657	21	0	0	5,966	1,369	184	1,915	18,141
	S.E.	1,480	210	776	18	0	0	906	277	130	559	1,369
19B+	Estimate	72,684	34,706	34,387	61	303	193	22,665	9,282	186	10,448	112,231
	S.E.	3,170	2,073	2,947	36	99	97	1,916	709	63	1,204	4,316
28	Estimate	31,703	13,009	4,234	0	238	50	6,991	1,884	638	3,236	30,280
	S.E.	1,707	996	455	0	85	28	702	237	106	372	1,380
29	Estimate	26,492	12,843	3,242	19	215	43	7,245	1,562	646	3,170	28,985
	S.E.	1,449	1,067	366	15	55	16	580	168	120	263	1,313
Total	Estimate	582,946	571,980	181,896	3,145	918	919	167,783	70,817	5,212	65,081	1,067,751 *
	S.E.	9,424	15,946	4,809	363	151	173	5,009	2,314	523	4,354	18,090

* In addition, an estimated 1,503 steelhead, cutthroat trout and unidentified salmon were caught by sport fishermen.

Table 5. Monthly catch success (catch per boat trip) by species, Strait of Georgia, 1986. *

Month	Coho	Chinook	Total ** Salmon	Rock-Fish	Lingcod	Total Non-Salmon	All Finfish
Jan+Feb	0.06	0.66	0.72	0.23	0.00	0.53	1.24
Mar	0.74	0.48	1.22	0.24	0.01	0.47	1.69
Apr	0.97	0.38	1.36	0.26	0.10	0.51	1.86
May	1.55	0.42	1.97	0.29	0.21	0.62	2.59
Jun	1.07	0.50	1.58	0.24	0.10	0.41	1.99
Jul	1.42	0.24	1.67	0.27	0.15	0.50	2.17
Aug	0.77	0.22	1.00	0.35	0.11	0.58	1.58
Sep	0.72	0.19	0.92	0.24	0.10	0.53	1.45
Oct	0.58	0.10	0.69	0.28	0.14	0.64	1.33
Nov+Dec	0.06	0.75	0.81	0.27	0.05	0.44	1.25
Total	0.98	0.31	1.30	0.29	0.12	0.53	1.83

* Calculated using Table 3 data.

** Includes coho, chinook, pink, chum and sockeye.

Table 6. Identification of rockfish by species in each Statistical Area, Strait of Georgia, 1986.

Species	Statistical Area										Total Sample
	13	14	15	16	17	18	19A	19B+	28	29	
Quillback (Sebastes maliger)	216	323	61	648	189	38	130	382	178	25	2,190
Copper (S. caurinus)	221	123	4	490	197	74	18	113	196	63	1,499
Yelloweye (S. ruberrimus)	34	75	5	94	40	0	12	42	40	4	346
Black (S. melanops)	5	6	0	0	1	1	8	166	1	2	190
Tiger (S. nigrocinctus)	1	6	0	6	3	1	0	1	0	0	18
Yellowtail (S. flavidus)	0	1	0	0	3	0	0	5	0	0	9
China (S. nebulosus) *	0	0	0	0	0	0	0	0	0	0	0
Canary (S. pinniger)	0	10	0	3	2	0	1	4	1	1	22
Unidentified	99	85	22	280	216	42	46	437	271	59	1,557
Total sample	576	629	92	1,521	651	156	215	1,150	687	154	5,831

* China rockfish were not observed during the 1986 identification program, but were reported for the study area in other years.

Table 7. Estimated catch of rockfish by species and Statistical Area, Strait of Georgia, 1986. *

Species		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Quillback	Catch	7,967	10,619	1,792	20,839	5,356	3,149	3,607	7,529	1,811	1,176	63,845
	S.D.	695	949	209	1,559	510	511	584	711	217	236	2,308
Copper	Catch	8,151	4,044	117	15,758	5,583	6,132	499	2,227	1,995	2,964	47,470
	S.D.	706	462	59	1,260	526	711	137	274	234	373	1,837
Yelloweye	Catch	1,254	2,466	147	3,023	1,134	0	333	828	407	188	9,780
	S.D.	226	333	65	371	193	0	107	144	75	94	623
Black	Catch	184	197	0	0	28	83	222	3,272	10	94	4,090
	S.D.	83	82	0	0	28	83	85	363	10	67	406
Other **	Catch	3,689	3,354	646	9,294	6,348	3,562	1,305	8,809	2,768	2,823	42,598
	S.D.	1,039	1,239	85	2,794	1,110	526	665	1,714	621	358	3,979
Total	Catch	21,245	20,680	2,702	48,914	18,449	12,926	5,966	22,665	6,991	7,245	167,783
	S.D.	1,456	1,663	242	3,459	1,344	1,025	906	1,916	702	580	5,009

* Calculated using data from Table 6 and Appendix B-9.

** Other includes tiger, yellowtail, china, canary and unidentified rockfish.

Table 8. Monthly number of marked chinook observed by region, Strait of Georgia, 1986.

Month		North Gulf	South Gulf	Victoria	Total Sample
Jan+Feb	Obs *	7	3	18	28
	Insp **	223	74	990	1,287
Mar	Obs	0	0	1	1
	Insp	40	76	258	374
Apr	Obs	4	1	3	8
	Insp	58	156	354	568
May	Obs	18	11	1	30
	Insp	471	440	96	1,007
Jun	Obs	39	18	0	57
	Insp	959	711	201	1,871
Jul	Obs	38	22	5	65
	Insp	836	373	167	1,376
Aug	Obs	33	9	7	49
	Insp	945	195	180	1,320
Sep	Obs	16	1	1	18
	Insp	286	142	130	558
Oct	Obs	6	2	1	9
	Insp	115	30	49	194
Nov+Dec	Obs	8	3	16	27
	Insp	169	51	889	1,109
Total	Obs	169	70	53	292
	Insp	4,102	2,248	3,314	9,664
Proportion of marks		0.041	0.031	0.016	0.030

* Obs - marks observed.

** Insp - fish inspected.

Table 9. Monthly number of marked coho observed by region, Strait of Georgia, 1986.

Month		North Gulf	South Gulf	Victoria	Total Sample
Jan+Feb +	Obs *	0	1	3	4
	Insp **	1	30	100	131
Mar +	Obs	11	7	10	28
	Insp	195	101	194	490
Apr +	Obs	42	49	6	97
	Insp	923	951	128	2,002
May	Obs	152	33	0	185
	Insp	2,556	953	11	3,520
Jun	Obs	230	30	13	273
	Insp	3,619	497	244	4,360
Jul	Obs	428	71	32	531
	Insp	7,423	1,140	576	9,139
Aug	Obs	185	56	5	246
	Insp	3,629	759	129	4,517
Sep	Obs	38	73	10	121
	Insp	1,134	572	460	2,166
Oct	Obs	18	3	18	39
	Insp	262	101	874	1,237
Nov+Dec	Obs	0	0	2	2
	Insp	1	9	75	85
Total	Obs	1,104	323	99	1,526
	Insp	19,743	5,113	2,791	27,647
Proportion of marks		0.056	0.063	0.035	0.055

* Obs - marks observed.

** Insp - fish inspected.

+ No samples taken from January to April. Data estimated using 1985-88 average proportions.

Table 10. Monthly estimated catch of marked chinook by region, Strait of Georgia, 1986. *

Month		North Gulf	South Gulf	Victoria	Total
Jan+Feb	Catch	48	49	135	232
	S.D.	20	29	51	62
Mar	Catch	0	0	10	10
	S.D.	0	0	10	10
Apr	Catch	147	22	21	190
	S.D.	90	23	13	94
May	Catch	553	229	21	803
	S.D.	139	71	22	158
Jun	Catch	1,021	368	0	1,389
	S.D.	182	91	0	203
Jul	Catch	810	376	70	1,256
	S.D.	135	83	32	162
Aug	Catch	966	270	135	1,371
	S.D.	172	91	55	202
Sep	Catch	449	25	20	494
	S.D.	126	26	21	130
Oct	Catch	65	23	7	95
	S.D.	29	17	8	35
Nov+Dec	Catch	74	61	132	267
	S.D.	33	37	44	66
Total	Catch	4,133	1,423	551	6,107
	S.D.	356	179	99	411

* Calculated using data from Table 8 and Appendix B-3.

Table 11. Monthly estimated catch of marked coho by region, Strait of Georgia, 1986. *

Month		North Gulf	South Gulf	Victoria	Total
Jan+Feb **	Catch	0	11	15	26
	S.D.	0	12	10	16
Mar **	Catch	135	276	73	484
	S.D.	45	119	34	132
Apr **	Catch	322	629	51	1,002
	S.D.	87	169	27	192
May	Catch	4,455	691	0	5,146
	S.D.	717	158	0	734
Jun	Catch	4,987	639	256	5,882
	S.D.	528	131	79	550
Jul	Catch	7,695	1,053	473	9,221
	S.D.	493	145	91	522
Aug	Catch	5,490	1,359	94	6,943
	S.D.	450	189	47	490
Sep	Catch	1,119	1,351	217	2,687
	S.D.	227	218	76	324
Oct	Catch	340	47	107	494
	S.D.	117	28	28	124
Nov+Dec	Catch	0	0	13	13
	S.D.	0	0	11	11
Total	Catch	24,543	6,056	1,299	31,898
	S.D.	1,146	436	159	1,236

* Calculated using data from Table 9 and Appendix B-2.

** No samples taken from January to April. Data estimated using 1985-88 average proportions.

Table 12. Monthly number and percent age composition of chinook sampled for age in the Strait of Georgia Creel Survey, 1986 (n gives sample size).

Month	Age 2		Age 3		Age 4		Age 5+		Total Sample
	n	%	n	%	n	%	n	%	
Jan+Feb	1	0.7%	54	35.3%	93	60.8%	5	3.3%	153
Mar	1	2.6%	18	46.2%	16	41.0%	4	10.3%	39
Apr	0	0.0%	14	43.8%	15	46.9%	3	9.4%	32
May	3	0.9%	141	43.8%	166	51.6%	12	3.7%	322
Jun	19	4.0%	242	50.9%	192	40.4%	22	4.6%	475
Jul	27	9.7%	116	41.9%	123	44.4%	11	4.0%	277
Aug	27	11.3%	105	44.1%	100	42.0%	6	2.5%	238
Sep	44	43.1%	36	35.3%	20	19.6%	2	2.0%	102
Oct	41	63.1%	23	35.4%	1	1.5%	0	0.0%	65
Nov+Dec	75	35.2%	124	58.2%	14	6.6%	0	0.0%	213
Total	238	-	873	-	740	-	65	-	1,916
Overall age composition of catch *	-	10.9%	-	44.9%	-	40.4%	-	3.8%	-

* Overall age composition of estimated catch based on data from Table 13.

Table 13. Monthly estimated catch at age of chinook in the Strait of Georgia, 1986. *

Month		Age 2	Age 3	Age 4	Age 5+	Total **
Jan+Feb	Catch	66	3,579	6,164	331	10,140
	S.D.	69	873	1,397	166	1,657
Mar	Catch	129	2,318	2,060	515	5,022
	S.D.	128	455	439	249	691
Apr	Catch	0	3,512	3,762	752	8,026
	S.D.	0	876	901	432	1,329
May	Catch	239	11,231	13,223	956	25,649
	S.D.	138	1,019	1,118	278	1,544
Jun	Catch	1,736	22,103	17,536	2,009	43,384
	S.D.	403	1,597	1,392	434	2,200
Jul	Catch	2,588	11,119	11,790	1,054	26,551
	S.D.	484	899	917	314	1,408
Aug	Catch	4,193	16,306	15,530	932	36,961
	S.D.	781	1,378	1,355	378	2,118
Sep	Catch	6,141	5,024	2,791	280	14,236
	S.D.	882	806	612	198	1,357
Oct	Catch	1,238	694	30	0	1,962
	S.D.	201	148	30	0	251
Nov+Dec	Catch	3,509	5,801	655	0	9,965
	S.D.	675	1,032	204	0	1,250
Total	Catch	19,839	81,687	73,541	6,829	181,896
	S.D.	1,523	3,126	3,039	907	4,809 ++
Overall Age Composition		10.9%	44.9%	40.4%	3.8%	100.0%

* Calculated by applying to total monthly chinook catch the monthly age proportions from Table 12.

** Monthly total catch from Table 3.

++ S.E.

Table 14. Monthly mean nose–fork length (L) at age of chinook sampled in the Strait of Georgia Creel Survey, 1986 (n gives sample size).

Month	Age 2		Age 3		Age 4		Age 5		Age 6		Total Sample
	L (cm)	n	L (cm)	n	L (cm)	n	L (cm)	n	L (cm)	n	
Jan+Feb	-	0	54.2	55	67.2	93	74.6	5	-	0	153
Mar	38.0	1	55.8	18	67.8	16	84.3	4	-	0	39
Apr	-	0	54.9	14	68.8	15	74.7	3	-	0	32
May	42.3	3	60.0	141	74.8	166	85.3	11	79.0	1	322
Jun	47.6	19	62.5	242	77.0	192	84.5	22	-	0	475
Jul	47.7	27	64.6	116	79.3	123	88.3	11	-	0	277
Aug	48.6	27	67.2	105	83.6	100	93.0	6	-	0	238
Sep	47.8	44	66.1	36	84.9	20	99.5	2	-	0	102
Oct	49.8	41	66.4	23	104.0	1	-	0	-	0	65
Nov+Dec	53.0	75	65.6	124	74.6	14	-	0	-	0	213
Total	49.7	237	62.9	874	76.4	740	85.3	64	79.0	1	1,916

APPENDICES

APPENDIX A

METHODS AND EQUATIONS USED IN ANALYSIS OF CATCH AND EFFORT STATISTICS FOR THE STRAIT OF GEORGIA SPORT FISHERY CREEL SURVEYS, 1983-1986[1].

[1]Adapted from:

Shardlow, T. F., K. K. English, T. Hoyt, G. E. Gillespie and T. A. Calvin. 1989. Strait of Georgia Creel Survey sport fishery statistics, 1983. Can. MS Rep. Fish. Aquat. Sci. 1872 : 53 p.

METHODS AND EQUATIONS USED IN ANALYSIS OF CATCH AND EFFORT STATISTICS FOR THE STRAIT OF GEORGIA SPORT FISHERY CREEL SURVEYS, 1983 - 1986.

The description of terms, variables and subscripts used in the data analysis is given in Table A-1.

Calculation of Catch and Effort Statistics

To estimate the monthly catch and effort, three components had to be calculated from that month's data:

(1) the weighted mean daily fishing pattern from interview data,
(2) the weighted mean catch per unit effort from interview data and
(3) the mean sport count from overflight data.

The equations used to estimate the means and variances for all catch and effort statistics are shown below. For April which had only overflight data, the interview data from preceding and following months were combined to estimate the mean daily fishing activity pattern and catch per unit effort. The catch and effort estimates for April are referred to as indirect estimates.

Weighting factors used to estimate the daily fishing activity pattern and mean catch per unit effort were calculated using the equations derived from DPA Consulting Ltd. (1982).

The data obtained from each shift were multiplied by the following weighting factor (W1) to expand for all possible stints at each site. The formula reads:

$$W1_{dij} = \frac{N_d}{n_{dij}} \qquad (1)$$

where N_d is the total number of days of type d in that month and n_{dij} is the number of times the jth work block at the ith site was sampled on type d days.

The interviews aggregrated by work block were multiplied by the weighting factor W2 to expand for all boats that landed in each work block. The formula reads:

$$W2_{dijk} = \frac{L_{dijk}}{I_{dijk}} \qquad (2)$$

where L_{dijk} is the number of boats landed and I_{dijk} is the number of boats interviewed on the kth stint in the jth work block at the ith site on a day type d.

Therefore, the following equations can be used to calculate an unbiased estimate of the total monthly catch ($\hat{C}_{dgr}$), fishing trips ($\hat{T}_{dg}$) and fishing activity in time block $\hat{A}_{dgt}$ for each day type (d) where g is a set of landing sites (i). These formulas read:

Table A-1. Description of terms, variables and subscripts used in this report.

DESCRIPTION OF TERMS

Shift/Stint	-	Represents a combination of a day type and landing site which was sampled on a single day. i.e. one sampling stint performed by an interviewer.
Work block	-	Represents one of four possible periods at a particular site of a given day type. Work Block 1 is before 11 AM Work Block 2 is 11 AM - 3 PM Work Block 3 is 3 PM - 7 PM Work Block 4 is after 7 PM
Day type	-	There are two possible day types: weekdays and weekends; holidays are considered to be weekend days.
Time block	-	Each day is divided into 16 time blocks which are: 1) before 7 AM 2) 7:00 - 7:59 AM 3) 8:00 - 8:59 AM . . . 15) 8:00 - 8:59 PM 16) after 9 PM

DESCRIPTION OF VARIABLES

A	-	Number of boats actively fishing
B	-	Number of boats observed on a flight
C	-	Catch
C'	-	Catch of marked salmon
CPE	-	Catch per boat trip
E	-	Effort (estimated total number of boat trips)
I	-	Number of boats interviewed and found to have been fishing
L	-	Number of boats landing
n	-	Number sampled
N	-	Population size from which n samples were observed
P	-	Proportion
T	-	Number of boat trips
V	-	Number found to be marked
W1	-	Weighting factor to expand for all possible stints at each site
W2	-	Weighting factor to expand for all boats that landed in each work block

DESCRIPTION OF SUBSCRIPTS

a	-	age
g	-	a set of landing sites
d	-	day type
i	-	site
j	-	work block
k	-	stint
l	-	landing time block
m	-	month
q	-	the next boat landing at site i and upon interviewing, found to have been fishing(q ranges from 1 to n)
r	-	species
s	-	sub-Statistical Area
t	-	time block
u	-	flight
x	-	region
y	-	annual

$$\hat{C}_{dgr} = \sum_i \sum_j \left[W1_{dij} \sum_k \sum_q \left(W2_{dijk} C_{dijkqr} \right) \right] \qquad (3)$$

$$\hat{T}_{dg} = \sum_i \sum_j \left[W1_{dij} \sum_k \sum_q \left(W2_{dijk} \right) \right] \qquad (4)$$

$$\hat{A}_{dgt} = \sum_i \sum_j \left[W1_{dij} \sum_k \sum_q \left(W2_{dijk} A_{dijkqt} \right) \right] \qquad (5)$$

where C_{dijkqr} is the catch of species r by the qth fishing party, and A_{dijkqt} can equal 0 or 1, thereby indicating whether the qth fishing party was actively fishing in time block t. Thus, the mean monthly catch per unit effort (CPE_{dgr}) measured in terms of numbers of fish kept per completed boat trip, and proportion of daily fishing effort active during the hour of the aerial survey (P_{dgt}) can be calculated with the following equations:

$$CPE_{dgr} = \frac{\hat{C}_{dgr}}{\hat{T}_{dg}} \qquad (6)$$

$$P_{dgt} = \frac{\hat{A}_{dgt}}{\hat{T}_{dg}} \qquad (7)$$

where CPE_{dgr} and P_{dgt} are calculated for each day type (d) and group of landing sites (g). The groups of landing sites reflect geographic areas with similar catch rates and/or activity patterns.

The estimated mean number of boats fishing during the hour of the sport boat count by overflight was calculated for each sub-Statistical Area using the following equation:

$$\bar{B}_{dst} = \frac{\sum_u B_{dstu}}{n_{ds}} \qquad (8)$$

where B_{dstu} is the number of boats observed fishing on flight u at time t, in sub-Statistical Area s for day type d.

The mean sport boat count at the time of the overflight ($\bar{B}_{dst}$) and proportion of daily fishing effort active during the hour of the overflight (P_{dgt}) were used in the following equation to calculate the total fishing effort for sub-Statistical Area s on day type d:

$$E_{ds} = \bar{B}_{dst} \frac{1}{P_{dgt}} N_d \qquad (9)$$

where N_d is the number of type d days in the month. Interview data for the sub-Statistical Areas fished (s) by anglers landing at each of the sites (i) within a landing group (g) were used to select the proportions (P_{dgt}) that are appropriate for each mean boat count ($\bar{B}_{dst}$).

The estimate for total effort by sub-Statistical Area and day type (E_{ds}) and the weighted catch per boat trip for a group of landing sites by day type, area and species (CPE_{dgr}) were used to calculate total catch for each species (r) and each sub-Statistical Area (s).

$$C_{sr} = \sum_{d} (E_{ds} CPE_{dgr}) \qquad (10)$$

The interview data were also used to select the catch per effort estimates (CPE_{dgr}) that should be applied to the effort estimate (E_{ds}) for a specific sub-Statistical Area (s).

Variance of Total Fishing Effort

The variance for estimates of total fishing effort has two components:

(1) the variance in aerial sport boat counts:

$$S^2_{B_{dst}} = \frac{\sum_u B^2_{dstu} - \frac{\left(\sum_u B_{dstu}\right)^2}{n_{ds}}}{n_{ds}(n_{ds}-1)} \left[\frac{N_d - n_{ds}}{N_d - 1}\right] \qquad (11)$$

where B_{dstu} is the aerial sport boat count at time t during an aerial survey u on a type d day in sub-area s; n_{ds} is the number of aerial surveys in which boats were counted on type d days, in sub-Statistical Area s; and N_d is the total number of type d days in the month.

(2) the variance in the proportion of boats fishing during the hours of the aerial boat counts:

$$S^2_{P_{dgt}} = \frac{P_{dgt}(1-P_{dgt})}{I_{dg}} \qquad (12)$$

where P_{dgt} is the mean proportion of boats fishing for a group of landing sites g during the hour of the aerial boat count t on type d days, and I_{dg} is the total number of sport fishing boats interviewed. The above formula assumes P_{dgt} is unbiased and normally distributed where the number of interviews is large.

The variances for boat counts ($S^2_{B_{dst}}$) and proportion of boats fishing ($S^2_{P_{dgt}}$) were combined in the following equation to calculate variance for effort:

$$S^2_{E_{ds}} = N^2_d \left(\frac{B^2_{dst}}{P^2_{dgt}}\right)\left(\frac{S^2_{B_{dst}}}{B^2_{dst}} + \frac{S^2_{P_{dgt}}}{P^2_{dgt}}\right) \qquad (13)$$

where $S^2_{E_{ds}}$ is the variance for total effort on type d days in sub-area s, and the formula is the standard formula for the variance of a ratio of two independent random variables.

Variance of Total Catch

The variance for estimates of total catch had two components: (1) the variance for total effort (presented above), and (2) the variance for catch per boat trip.

The variance for catch per boat trip($S^2_{CPE_{dgr}}$) was calculated using the following equation:

$$S^2_{CPE_{dgr}} = \frac{SS_{CPE_{dgr}} - \frac{\left(S_{CPE_{dgr}}\right)^2}{I_{dg}}}{I_{dg}\left(I_{dg}-1\right)} \qquad (14)$$

where $SS_{CPE_{dgr}}$ is the weighted sum of squares for CPE_{dgr}, and $S_{CPE_{dgr}}$ is the weighted sum for CPE_{dgr}, such that the sum of the weighting factors used to estimate CPE_{dgr} was equal to the number of interviewed boat trips (I_{dg}).

The variance for total effort and the variance in the catch per boat trip for the appropriately grouped landing sites were combined in the following equation to calculate variance for total catch:

$$S^2_{C_{sr}} = \sum_d \left(E^2_{ds} S^2_{CPE_{dgr}} + CPE^2_{dgr} S^2_{E_{ds}} + S^2_{CPE_{dgr}} S^2_{E_{ds}} \right) \qquad (15)$$

which is the standard formula for the variance of the product of two independent random variables, and where S^2C_{sr} is the variance for total number of species r in sub-Statistical Area s.

Estimation of Marked Chinook and Coho Salmon

Incidence of marked (adipose-clipped) chinook and coho was recorded in each interview. The proportion of marks observed for each region, month and species (P_{xmr}) was calculated as:

$$P_{xmr} = \frac{V_{xmr}}{n_{xmr}} \qquad (16)$$

where V is the number of marked fish observed and n is the number of fish inspected by region(x), month(m) and species (r).

The variance of each proportion was calculated as:

$$S^2_{P_{xmr}} = \frac{P_{xmr}(1 - P_{xmr})}{n_{xmr}} \qquad (17)$$

Monthly catch estimates of marked salmon were calculated as:

$$C'_{xmr} = P_{xmr} C_{xmr} \qquad (18)$$

where C_{xmr} is the estimated catch of species r in region x and month m.

The variance of the marked catch estimates was calculated as:

$$S^2_{C'_{xmr}} = P^2_{xmr} S^2_{C_{xmr}} + C^2_{xmr} S^2_{P_{xmr}} + S^2_{C_{xmr}} S^2_{P_{xmr}} \qquad (19)$$

where S^2C_{xmr} is the variance of the catch estimate of species r in region x and month m.

The estimated annual proportions of marked salmon caught in each region (weighted by the corresponding regional annual catch estimates) were calculated as:

$$P_{xry} = \frac{C'_{xry}}{C_{xry}} \qquad (20)$$

where

$$C'_{xry} = \sum_{m} C'_{xmr} \quad \text{and} \quad C_{xry} = \sum_{m} C_{xmr} \qquad (21)$$

The variance of the annual proportions was calculated as:

$$S^2_{P_{xry}} = \left(\frac{C'_{xry}}{C_{xry}}\right)^2 \left[\frac{S^2_{C'_{xry}}}{(C'_{xry})^2} + \frac{S^2_{C_{xry}}}{(C_{xry})^2}\right] \qquad (22)$$

where $S^2_{C_{xry}}$ is the variance of the annual estimated catch of species r in region x.

Estimation of Age Composition of Chinook Catch

Scale samples and length measurements were taken in a subsampling program during the interview process. Ages used in this report represent total age of the fish (including both freshwater and oceanic life) according to the Gilbert-Rich (1927) recording convention.

The proportion of chinook at each age and month (P_{am}) was calculated as:

$$P_{am} = \frac{a_m}{n_m} \qquad (23)$$

where a_m represents the number of fish observed at age a during month m, and n_m is the total number of fish biosampled in that month.

The variance of each proportion was calculated as:

$$S^2_{am} = \frac{P_{am}(1 - P_{am})}{n_m} \qquad (24)$$

The catch at age of chinook in each month was calculated as:

$$C_{am} = P_{am} C_m \qquad (25)$$

where C_m is the estimated catch of chinook salmon in a given month m.

The variance of the catch at age estimate was calculated as:

$$S^2_{C_{am}} = P^2_{am} S^2_{C_m} + C^2_m S^2_{P_{am}} + S^2_{C_m} S^2_{P_{am}} \qquad (26)$$

where $S^2_{C_m}$ is the variance of the monthly catch estimate C_m.

The annual catch at age was calculated as:

$$C_{ay} = \sum_m C_{am} \qquad (27)$$

with a variance

$$S^2_{C_{ay}} = \sum_m S^2_{C_{am}} \qquad (28)$$

The annual proportion at age (weighted by monthly catch) was calculated as:

$$P_{ay} = \frac{C_{ay}}{C_y} \qquad (29)$$

with a variance

$$S^2_{P_{ay}} = \left(\frac{C_{ay}}{C_y}\right)^2 \left[\frac{S^2_{C_{ay}}}{(C_{ay})^2} + \frac{S^2_{C_y}}{(C_y)^2}\right] \qquad (30)$$

APPENDIX B

CATCH AND EFFORT STATISTICS BY MONTH AND STATISTICAL AREA FOR STRAIT OF GEORGIA, 1986.

APPENDIX B-1. STRAIT OF GEORGIA FISHING EFFORT (NO. BOAT TRIPS), 1986.

Month		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Estimate	1,080	443	117	2,647	2,138	715	247	5,788	1,434	859	15,468
	S.E.	352	192	91	424	330	132	76	1,519	501	165	1,751
March	Estimate	629	993	162	602	1,883	542	396	3,425	1,365	477	10,474
	S.E.	126	134	162	124	352	134	22	444	346	73	735
April	Estimate	1,493	2,147	136	4,163	6,125	867	817	2,961	1,574	655	20,938
	S.E.	527	417	111	2,056	1,389	165	110	552	361	345	2,686
May	Estimate	10,379	15,747	1,735	8,704	7,636	2,904	3,679	6,042	2,563	1,970	61,359
	S.E.	1,812	2,350	318	807	1,005	396	664	972	637	444	3,566
June	Estimate	18,004	20,364	2,846	10,053	11,348	3,718	4,982	10,150	3,139	2,747	87,351
	S.E.	2,022	2,651	474	818	1,213	348	736	732	310	579	3,887
July	Estimate	34,180	22,391	2,791	12,729	10,798	4,988	4,897	9,286	4,973	4,481	111,514
	S.E.	1,789	1,577	258	984	1,132	476	698	405	519	383	3,049
August	Estimate	47,400	35,260	4,597	22,375	16,215	7,830	4,248	13,122	8,119	7,779	166,945
	S.E.	2,044	2,874	454	1,371	1,425	508	445	1,619	525	581	4,499
September	Estimate	16,556	16,067	1,322	6,368	6,544	3,065	3,326	10,153	6,619	5,145	75,165
	S.E.	2,828	2,155	176	616	701	386	573	1,009	1,082	925	4,131
October	Estimate	2,111	3,640	287	1,397	2,059	2,384	1,016	4,979	783	1,737	20,393
	S.E.	660	312	52	324	368	264	249	355	265	250	1,080
Nov+Dec	Estimate	345	307	130	1,483	863	987	670	6,778	1,134	642	13,339
	S.E.	144	113	74	420	249	233	339	1,353	356	115	1,555
Total	Estimate	132,177	117,359	14,123	70,521	65,609	28,000	24,278	72,684	31,703	26,492	582,946
	S.E.	4,860	5,318	827	3,042	2,940	1,048	1,480	3,170	1,708	1,449	9,425

APPENDIX B-2. STRAIT OF GEORGIA COHO CATCH SUMMARY, 1986.

Month		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	32	32	0	0	253	0	0	512	39	33	901
	S.E.	24	25	0	0	116	0	0	116	44	25	175
March	Catch	22	2,365	0	0	3,966	0	12	1,417	0	0	7,782
	S.E.	25	370	0	0	860	0	16	478	0	0	1,052
April	Catch	883	5,357	12	834	12,013	9	0	1,091	123	59	20,381
	S.E.	596	1,373	19	445	2,787	10	0	338	72	48	3,214
May	Catch	17,142	51,946	1,909	3,911	19,134	205	239	217	222	159	95,084
	S.E.	3,840	9,728	398	684	2,983	82	112	128	70	58	10,906
June	Catch	31,822	30,540	5,565	10,541	9,156	454	319	4,808	338	315	93,858
	S.E.	4,311	4,753	953	1,349	1,064	87	135	705	51	79	6,750
July	Catch	83,011	29,407	4,339	16,700	10,556	929	240	8,512	2,523	2,652	158,869
	S.E.	5,043	2,415	450	1,577	1,192	136	84	716	296	278	6,006
August	Catch	56,231	24,857	4,516	22,093	5,289	2,339	122	2,437	5,240	5,435	128,559
	S.E.	2,881	2,475	585	1,879	631	267	65	504	468	483	4,413
September	Catch	17,648	10,338	844	4,574	2,230	426	46	9,987	4,195	3,687	53,975
	S.E.	3,655	1,769	151	654	285	108	27	1,526	808	898	4,563
October	Catch	2,899	1,463	170	417	431	394	51	5,219	250	460	11,754
	S.E.	1,215	213	44	130	102	91	35	558	120	99	1,377
Nov+Dec	Catch	0	0	0	12	112	65	0	506	79	43	817
	S.E.	0	0	0	16	75	89	0	146	68	27	201
Total	Catch	209,690	156,305	17,355	59,082	63,140	4,821	1,029	34,706	13,009	12,843	571,980
	S.E.	9,069	11,592	1,279	2,991	4,524	363	210	2,073	997	1,068	15,947

APPENDIX B-3. STRAIT OF GEORGIA CHINOOK CATCH SUMMARY, 1986.

Month		Statistical Area 13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	508	93	132	783	547	147	52	7,412	275	191	10,140
	S.E.	168	74	105	216	130	48	23	2,169	100	48	2,197
March	Catch	282	356	67	183	1,071	132	42	2,583	243	63	5,022
	S.E.	84	76	72	131	205	88	29	328	130	19	459
April	Catch	942	372	53	763	2,384	195	188	2,455	502	172	8,026
	S.E.	568	106	44	451	605	64	72	611	240	145	1,169
May	Catch	3,937	4,323	1,756	4,448	3,652	1,662	1,859	2,038	1,109	865	25,649
	S.E.	901	711	368	695	419	282	497	449	288	238	1,667
June	Catch	10,791	10,136	1,304	2,877	8,349	1,638	2,784	3,740	995	770	43,384
	S.E.	1,492	1,450	226	332	997	199	478	439	137	201	2,450
July	Catch	9,653	5,976	377	1,816	3,787	686	1,109	2,352	401	394	26,551
	S.E.	642	584	67	221	385	120	232	210	61	51	1,036
August	Catch	15,694	8,794	411	2,750	3,501	799	787	3,467	314	444	36,961
	S.E.	968	877	74	466	391	178	166	566	58	78	1,572
September	Catch	4,487	2,828	148	557	1,584	1,128	665	2,617	124	98	14,236
	S.E.	971	470	36	97	228	333	178	415	39	25	1,242
October	Catch	212	707	131	202	96	123	60	364	18	49	1,962
	S.E.	105	204	32	53	42	35	36	68	15	21	257
Nov+Dec	Catch	103	97	159	1,213	319	155	111	7,359	253	196	9,965
	S.E.	72	49	92	406	146	68	83	1,602	110	62	1,672
Total	Catch	46,609	33,682	4,538	15,592	25,290	6,665	7,657	34,387	4,234	3,242	181,896
	S.E.	2,388	2,001	475	1,142	1,404	544	777	2,947	455	367	4,810

APPENDIX B-4. STRAIT OF GEORGIA PINK CATCH SUMMARY, 1986.

Month		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
March	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
April	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
May	Catch	44	41	0	0	0	0	0	0	0	0	85
	S.E.	39	37	0	0	0	0	0	0	0	0	54
June	Catch	104	141	0	47	113	0	0	0	0	0	405
	S.E.	32	55	0	33	43	0	0	0	0	0	84
July	Catch	479	134	12	7	27	0	0	16	0	0	675
	S.E.	78	54	7	7	10	0	0	16	0	0	97
August	Catch	1,141	108	0	224	26	0	21	19	0	19	1,558
	S.E.	246	42	0	112	16	0	18	20	0	15	276
September	Catch	368	21	0	0	0	0	0	26	0	0	415
	S.E.	190	20	0	0	1	0	0	26	0	0	193
October	Catch	0	0	0	0	0	7	0	0	0	0	7
	S.E.	0	0	0	0	0	6	0	0	0	0	6
Nov+Dec	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
Total	Catch	2,136	445	12	278	166	7	21	61	0	19	3,145
	S.E.	324	97	7	117	47	6	18	36	0	15	364

APPENDIX B-5. STRAIT OF GEORGIA SOCKEYE CATCH SUMMARY, 1986.

Month		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
March	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
April	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
May	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
June	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
July	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
August	Catch	0	0	0	0	0	85	0	161	45	53	344
	S.E.	0	0	0	0	0	36	0	63	35	29	86
September	Catch	40	0	0	10	0	13	0	133	193	140	529
	S.E.	35	0	0	12	0	6	0	77	78	46	125
October	Catch	0	0	0	10	2	2	0	3	0	22	39
	S.E.	0	0	0	14	4	3	0	4	0	10	18
Nov+Dec	Catch	0	0	0	0	0	0	0	6	0	0	6
	S.E.	0	0	0	0	0	0	0	8	0	0	8
Total	Catch	40	0	0	20	2	100	0	303	238	215	918
	S.E.	35	0	0	18	4	37	0	100	85	55	153

APPENDIX B-6. STRAIT OF GEORGIA CHUM CATCH SUMMARY, 1986.

Month		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	0	0	0	0	0	0	0	0	22	9	31
	S.E.	0	0	0	0	0	0	0	0	23	8	24
March	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
April	Catch	0	0	0	0	0	0	0	7	0	0	7
	S.E.	0	0	0	0	0	0	0	7	0	0	7
May	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
June	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
July	Catch	11	0	0	0	0	0	0	0	0	0	11
	S.E.	8	0	0	0	0	0	0	0	0	0	8
August	Catch	219	0	0	0	0	0	0	118	0	0	337
	S.E.	92	0	0	0	0	0	0	91	0	0	129
September	Catch	196	0	0	0	0	1	0	26	17	18	258
	S.E.	63	0	0	0	0	1	0	26	13	11	70
October	Catch	101	3	1	2	98	1	0	28	11	16	261
	S.E.	71	3	2	2	46	2	0	13	11	9	87
Nov+Dec	Catch	0	0	0	0	0	0	0	14	0	0	14
	S.E.	0	0	0	0	0	0	0	16	0	0	16
Total	Catch	527	3	1	2	98	2	0	193	50	43	919
	S.E.	132	3	2	2	46	2	0	97	29	16	174

APPENDIX B-7. STRAIT OF GEORGIA CATCH SUMMARY FOR TOTAL SALMONIDS, 1986. *

Month		Statistical Area 13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	541	125	132	783	802	147	52	7,926	339	235	11,082
	S.E.	177	81	105	216	190	48	23	2,196	117	59	2,230
March	Catch	307	2,727	67	183	5,038	132	54	4,002	243	63	12,816
	S.E.	91	405	72	131	1,003	88	31	637	130	19	1,278
April	Catch	1,827	5,732	66	1,599	14,400	204	188	3,555	626	234	28,431
	S.E.	885	1,449	58	718	3,332	66	72	794	264	170	3,904
May	Catch	21,127	56,318	3,666	8,363	22,790	1,870	2,098	2,256	1,332	1,027	120,847
	S.E.	4,334	10,236	727	1,149	3,300	315	541	514	344	284	11,711
June	Catch	42,724	40,828	6,872	13,472	17,624	2,093	3,104	8,550	1,334	1,088	137,689
	S.E.	5,277	5,971	1,158	1,593	1,983	251	518	956	171	265	8,524
July	Catch	93,166	35,527	4,730	18,530	14,376	1,615	1,350	10,884	2,926	3,049	186,153
	S.E.	5,493	2,805	487	1,722	1,536	197	270	787	339	310	6,674
August	Catch	73,294	33,768	4,930	25,073	8,824	3,226	931	6,208	5,601	5,954	167,809
	S.E.	3,619	3,188	624	2,178	933	335	184	1,039	491	531	5,569
September	Catch	22,751	13,194	993	5,146	3,818	1,570	712	12,793	4,534	3,951	69,462
	S.E.	4,617	2,127	173	695	446	353	184	1,782	858	942	5,613
October	Catch	3,521	2,196	311	673	725	611	116	5,673	282	561	14,669
	S.E.	1,374	375	66	163	166	123	59	587	132	113	1,575
Nov+Dec	Catch	159	172	160	1,298	484	540	111	7,905	333	241	11,403
	S.E.	89	78	92	417	221	427	83	1,713	146	68	1,842
Total	Catch	259,417	190,587	21,927	75,120	88,881	12,008	8,716	69,752	17,550	16,403	760,361
	S.E.	10,674	12,861	1,599	3,582	5,520	806	848	3,897	1,174	1,211	18,563

* Includes coho, chinook, pink, chum, sockeye, steelhead and cutthroat trout.

APPENDIX B-8. STRAIT OF GEORGIA CATCH SUMMARY FOR RELEASED SALMON, 1986.

Month		Statistical Area 13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	112	19	17	423	524	70	162	6,999	270	173	8,769
	S.E.	72	17	14	231	134	27	69	1,018	127	49	1,066
March	Catch	85	714	5	207	1,410	4	79	1,732	203	79	4,518
	S.E.	43	127	7	186	343	6	47	265	123	45	510
April	Catch	234	883	0	115	2,947	144	355	2,456	393	181	7,708
	S.E.	186	252	0	83	730	56	130	631	172	135	1,051
May	Catch	1,431	3,244	270	666	2,420	263	292	225	139	110	9,060
	S.E.	484	604	71	160	385	72	161	177	54	32	919
June	Catch	5,966	3,942	181	353	2,958	411	898	284	104	155	15,252
	S.E.	1,362	697	42	77	421	81	284	108	21	47	1,621
July	Catch	8,410	9,809	148	367	2,328	211	638	546	71	71	22,599
	S.E.	831	1,091	44	134	316	172	173	139	24	25	1,442
August	Catch	19,697	23,545	75	1,667	1,981	77	71	1,138	102	249	48,602
	S.E.	1,751	4,859	57	396	300	55	44	317	56	78	5,200
September	Catch	2,203	1,697	53	1,188	718	134	128	669	727	608	8,125
	S.E.	544	300	35	427	139	80	89	199	199	223	856
October	Catch	10,570	6,179	770	1,551	2,310	1,593	1,466	6,543	419	1,153	32,554
	S.E.	4,212	879	164	378	449	448	508	730	179	210	4,467
Nov+Dec	Catch	198	180	73	671	829	526	469	6,004	491	234	9,675
	S.E.	110	81	45	233	348	502	307	1,334	228	76	1,543
Total	Catch	48,906	50,212	1,592	7,208	18,425	3,433	4,558	26,596	2,919	3,013	166,862
	S.E.	4,892	5,158	206	825	1,235	712	723	2,005	438	364	7,626

APPENDIX B-9. STRAIT OF GEORGIA ROCKFISH CATCH SUMMARY, 1986.

Month		Statistical Area 13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	205	31	4	987	805	452	58	835	136	64	3,577
	S.E.	191	27	4	334	228	182	52	153	86	28	518
March	Catch	47	69	0	24	48	36	90	1,113	835	241	2,503
	S.E.	37	31	0	45	19	34	73	627	465	90	793
April	Catch	942	82	13	2,052	454	917	30	722	209	79	5,500
	S.E.	554	52	15	2,011	179	323	25	222	100	58	2,134
May	Catch	1,807	619	168	5,317	1,393	1,137	767	5,183	638	461	17,490
	S.E.	577	187	56	884	251	236	258	1,395	210	136	1,829
June	Catch	2,217	2,455	168	6,353	2,869	1,421	1,167	2,771	1,115	801	21,337
	S.E.	335	512	48	753	404	211	380	532	185	240	1,293
July	Catch	5,261	5,751	576	8,702	2,537	2,292	706	2,322	1,103	1,327	30,577
	S.E.	490	958	81	931	324	358	226	294	172	187	1,570
August	Catch	7,069	8,258	1,414	21,682	6,404	3,676	1,322	4,002	2,099	3,201	59,127
	S.E.	713	1,094	202	2,298	896	669	348	591	332	423	3,006
September	Catch	3,312	2,849	308	3,039	2,987	658	811	3,168	573	655	18,360
	S.E.	747	572	73	492	734	209	444	633	171	112	1,534
October	Catch	290	509	45	497	687	1,262	684	1,269	123	335	5,701
	S.E.	145	155	14	248	124	290	391	195	80	146	652
Nov+Dec	Catch	95	57	6	261	265	1,075	331	1,280	160	81	3,611
	S.E.	65	38	4	115	187	331	281	321	74	34	593
Total	Catch	21,245	20,680	2,702	48,914	18,449	12,926	5,966	22,665	6,991	7,245	167,783
	S.E.	1,457	1,664	242	3,460	1,344	1,026	906	1,916	702	581	5,010

APPENDIX B-10. STRAIT OF GEORGIA LINGCOD CATCH SUMMARY, 1986.

Month		Statistical Area 13	14	15	16	17	18	19A	19B+	28	29	Total	
Jan+Feb	Catch	0	0	0	61	0	0	0	13	0	0	74	*
	S.E.	0	0	0	59	0	0	0	8	0	0	60	
March	Catch	0	0	0	0	0	0	0	30	38	6	74	*
	S.E.	0	0	0	0	0	0	0	24	31	4	39	
April	Catch	485	33	0	0	486	338	16	463	154	80	2,055	
	S.E.	330	21	0	0	195	142	20	123	114	79	450	
May	Catch	4,096	782	86	3,147	768	721	307	2,317	273	205	12,702	
	S.E.	857	336	30	776	155	208	169	477	110	65	1,338	
June	Catch	2,821	1,383	78	1,548	1,081	625	219	896	229	194	9,074	
	S.E.	409	308	27	358	169	111	111	182	58	68	697	
July	Catch	5,674	3,958	342	2,138	1,041	1,046	118	1,387	377	400	16,481	
	S.E.	523	617	55	267	156	184	65	175	69	69	912	
August	Catch	8,499	2,026	718	2,076	1,978	772	444	1,503	510	406	18,932	
	S.E.	803	303	120	298	326	138	142	285	115	78	1,042	
September	Catch	3,430	1,368	23	315	693	289	160	1,379	125	100	7,882	
	S.E.	699	400	10	139	160	92	90	252	52	33	882	
October	Catch	577	164	25	47	266	384	71	1,104	139	146	2,923	
	S.E.	247	71	10	23	64	108	41	170	70	35	345	
Nov+Dec	Catch	206	0	0	32	19	75	34	190	39	25	620	*
	S.E.	188	0	0	23	25	51	42	148	37	16	254	
Total	Catch	25,788	9,714	1,272	9,364	6,332	4,250	1,369	9,282	1,884	1,562	70,817	
	S.E.	1,586	920	139	956	502	389	278	709	237	169	2,315	

* A total closure for lingcod was in effect from January 1 to April 15, and November 15 to December 31, 1986; see Table 3 footnote.

APPENDIX B-11. STRAIT OF GEORGIA DOGFISH CATCH SUMMARY, 1986.

Month		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	0	0	0	0	0	0	0	10	0	0	10
	S.E.	0	0	0	0	0	0	0	7	0	0	7
March	Catch	0	39	0	0	0	0	0	0	0	0	39
	S.E.	0	24	0	0	0	0	0	0	0	0	24
April	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
May	Catch	0	2	0	72	1	0	0	0	0	0	75
	S.E.	0	2	0	40	1	0	0	0	0	0	40
June	Catch	426	78	0	233	45	63	128	0	130	130	1,233
	S.E.	153	37	0	107	19	36	127	0	31	52	240
July	Catch	289	91	0	150	28	70	0	49	255	191	1,123
	S.E.	114	43	0	72	14	39	0	27	84	75	187
August	Catch	31	245	3	630	100	38	42	122	148	176	1,535
	S.E.	18	111	3	275	36	17	25	57	42	58	314
September	Catch	117	176	3	605	10	5	14	0	81	131	1,142
	S.E.	81	93	4	247	10	3	15	0	34	51	283
October	Catch	0	0	0	0	1	1	0	0	0	7	9
	S.E.	0	0	0	0	2	2	0	0	0	6	7
Nov+Dec	Catch	0	0	0	6	0	0	0	5	24	11	46
	S.E.	0	0	0	7	0	0	0	6	20	8	23
Total	Catch	863	631	6	1,696	185	177	184	186	638	646	5,212
	S.E.	208	157	5	394	44	56	130	64	106	120	524

APPENDIX B-12. STRAIT OF GEORGIA CATCH SUMMARY FOR OTHER FINFISH, 1986.

Month		Statistical Area 13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	0	50	1	445	791	2,728	3	378	89	39	4,524
	S.E.	0	40	1	216	421	1,440	4	191	95	33	1,532
March	Catch	0	16	0	0	303	439	75	1,348	63	13	2,257
	S.E.	0	18	0	0	93	724	88	449	40	6	863
April	Catch	234	54	0	0	54	1,780	50	416	329	108	3,025
	S.E.	186	43	0	0	48	1,225	49	135	174	91	1,264
May	Catch	707	176	38	1,045	2,789	1,334	40	1,325	303	188	7,945
	S.E.	312	75	15	251	899	683	32	538	138	59	1,324
June	Catch	304	383	8	476	867	470	159	883	392	292	4,234
	S.E.	70	130	5	108	170	107	111	175	85	104	367
July	Catch	937	1,073	2	1,545	317	1,872	616	790	508	464	8,124
	S.E.	135	214	2	260	61	1,281	357	162	93	76	1,394
August	Catch	2,029	2,897	45	3,376	1,609	2,664	690	1,482	617	1,095	16,504
	S.E.	288	425	19	435	426	941	381	302	105	142	1,337
September	Catch	894	3,653	162	1,876	275	2,534	201	1,681	650	575	12,501
	S.E.	276	1,301	81	414	89	2,299	117	433	192	105	2,737
October	Catch	58	1,468	46	365	30	69	81	1,757	193	357	4,424
	S.E.	40	672	19	166	15	29	53	742	107	90	1,027
Nov+Dec	Catch	103	76	66	297	58	424	0	388	92	39	1,543
	S.E.	79	48	48	151	74	228	0	139	61	23	339
Total	Catch	5,266	9,846	368	9,425	7,093	14,314	1,915	10,448	3,236	3,170	65,081
	S.E.	567	1,549	99	775	1,106	3,527	559	1,205	373	263	4,355

APPENDIX C. STRAIT OF GEORGIA CREEL SURVEY STUDY AREA.

The Strait of Georgia Creel Survey study area includes those waters of Juan de Fuca Strait and the Strait of Georgia bounded in the south by a line from Sheringham Pt. on Vancouver Island due south to an intersection with the International Boundary and along the International Boundary to the B.C. Mainland coast at Blaine (Boundary Bay) and in the north by the following 3 boundary lines:

1) in discovery passage from Granite Pt. on Quadra Island to the stream mouth west of Moriarity Pt. on Vancouver Island.

2) in Okisollo Channel from Granite Pt. on Quadra Island due north to Sonora Island.

3) in Cordero Channel from Burnt Bluff on the mainland 214° passing west of Dent Island to Sonora Island.

The area for which the Strait of Georgia Creel Survey statistics apply includes the above listed administrative area with the exception of the following areas:

1) Bute Inlet above a line from Lawrence Pt. running across the inlet. This area coincides with management units 13-21 and 13-22.

2) Waters of Pryce Channel, Waddington Channel, Pendrell Sound, Homfray Channel and Toba Inlet bounded by a line drawn from Horace Head on East Redonda Island at the south end of Waddington Channel to the northern point of Roscoe Bay on West Redonda Island and a line drawn within Homfray Channel from Price Pt. on the eastern shore of the channel by a line drawn from George Head at the easterly entrance of Ramsay Arm to Sutil Pt. on Cortes Island.

3) Hotham Sound above a line drawn from Elephant Point on the western shore of the Sound to the southern point of Granville Bay on the eastern shore of the Sound.

4) Jervis Inlet above a line drawn within Prince of Whales Reach from the mouth of Treat Creek on the east shore across the Reach to the summit (1625') at the head of Goliath Bay.

5) Sechelt Inlet including Narrows Inlet and Salmon Inlet above a line drawn within Skookumchuck Narrows from the "dog-leg" point southeast of the Egmont Pt. 224° across the Narrows to Sechelt Peninsula.

APPENDIX D. SPECIES COMMONLY INCLUDED WITH OTHER FINFISH.

Pacific Herring
Pacific Cod
Pacific Tomcod
Walleye Pollock
Pacific Hake
Perches - any perch, seaperch or surfperch
Greenlings
Flounders - Pacific Halibut, any flounder or sole